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THE PROVINCES OF

YE, TAVOY, AND MERGUI,

ON THE

TENASSERIM COAST:

VISITED AND EXAMINED BY ORDER OF GOVERNMENT, WITH THE VIEW TO DEVELOP THEIR NATURAL RESOURCES.

BY

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CALCUTTA:
G. H. HUTTMAN, BENGAL MILITARY ORPHAN PRESS.
1839.

[REPRINTED AT THE GOVERNMENT CENTRAL PRESS, 1875.]

CALCUTTA:

PRINTED BY THE SUPERINTENDENT OF GOVERNMENT PRINTING,
8, HASTINGS STREET.

PROCEEDINGS

FROM THE 14TH OF NOVEMBER 1837 TO THE 5TH OF MAY 1838.

OVERLAND JOURNEY FROM MOULMAIN TO MERGUI.

1*st.*—Ascent of the river Attaran in boats and examination of the hot springs on the Attaran. Progress to the upper part of the Zamie Khiaung.

2*nd.*—Overland trip from the Zamie Khiaung to the lower and upper teak forests and along the great eastern range to the Mickeli Khiaung.

3*rd.*—Tour to the pass of the three pagodas and the adjoining Siamese high table-lands.

4*th.*—From the Mickeli Khiaung to Lamain, missing the road and wandering seven days in the wilds, and from thence to Ye.

5*th.*—Excursions to the highest part of the eastern range called Zae-town and back.

6*th.*—Journey to the Malue mountains, and from thence to the Hinzai bay.

7*th.*—Journey along the coast to Zadie Yua.

8*th.*—Ascent of the Zadie mountains.

9*th.*—Journey from Nabulee Yua to Tavoy.

10*th.*—Excursions in the neighbourhood of Tavoy.

11*th.*—Journey to the eastward over the high range of mountains to Metamio—visit to the Tin territories, ascent of the Kamaung-thueg Bain Khiaung and part of the Upper Tenass-jerim, as far as the hot springs, and back to Tavoy.

12*th.*—Journey from Tavoy to the Towngbiaun valley and the Kiauk mountain.

13*th.*—Descent of the Towngbiaun valley and overland journey to Pai and Palouk.

14*th.*—Descent of the Palouk river and along the sea-coast to Palou.

15*th.* Overland journey from Palou to the east until falling in with the Tenasserim river at the Tarouk Khiaung.

16*th.*—Descent of the Tenasserim river to Mergui.

17*th.*—Second ascent of the Tenasserim, nine days' journey up from Mergui and back.

18*th*.—Third ascent to the village of Tenasserim and ascent of the Little Tenasserim, pursuing it as far as the high table-land separating the upper part of the Isthmus of Kraw from the Bay of Siam, to the coal-fields and back.

No. 1, No. 14, No. 17, and parts of Nos. 13 and 18, have been performed in boats—No. 16, and part of No. 18, on rafts.

The rest overland.

The overland journey led the greatest part through extensive districts without a road, following partly wild elephant paths, partly cutting a road through the jungles.

Parts of Nos. 2, 4, 6, 10, 12, 13, 14, 16, 17, 18, and the whole of 5, 8, 11, 15, have never been visited before by any European.

The greatest part of the visited country being uninhabited, provisions, sometimes for a fortnight, and once for a month, were carried by coolies.

I.

GENERAL REMARKS.

THE ancient distinction of India Gangetic and Trans-Gangem is not altogether objectionable, but to distinguish more properly Hindoostan from the regions to the east, these ought to be named (if India they shall be called) India Trans-Burhampooter, for immediately to the eastward of this river (not including its higher course) the change is great; the country assumes different features, the greatest part of spontaneously growing vegetable productions becomes different, the nations become a distinct race, adopting different manners and customs. It is reasonable to suggest that the permutation of the level plains into hilly and mountainous regions must produce every where considerable changes; but here they are striking and almost without intermediate links.

Difference of the regions of India Proper and the countries to the eastward, comprised under the name of Indo-China or India-exterior

Whilst the great extent of Hindoostan from Bombay to Dacca, (an extent of 2,000 miles in length) preserves almost the same general character, the features of the country beyond the Burhampooter at once strike the observer with the character of a new world.

This character remains, as far as it is known, the same throughout the regions of Assam, Muneepoor, East Silhet, Arracan, the Tenasserim Provinces, Pegu, Burma, Siam, and the much less penetrated countries towards the Chinese Seas.

Descending towards the Peninsula of Malacca, the features and productions of the countries assimilate to those of the Indian Archipelago, and between the two peninsulas, separated by the Bay of Bengal, little resemblance prevails excepting Ceylon, Tinevelly, and Travancore, which seem to approach much more to the great family of the Molluccas than any of the territories comprising the peninsula of Hindoostan.

An extent of seven degrees of latitude in a temperate zone is accompanied by great changes in climate and productions; in tropical regions the difference to a superficial observer is almost none,— to a strict examiner gradual. In a temperate zone, the difference is chiefly produced by the degree of latitude, by its western or eastern situation besides altitude, &c.; in tropical regions latitude, &c., is of minor importance; the quantity of rain, and the distribution of moisture, are the chief agencies of changes.

Difference in the Tenasserim provinces.

The difference in the natural productions, which is remarkable in the northern and southern parts of Tenasserim, is owing to the difference of climate with respect to the distribution of rain throughout the year.

Difference of rain in the northern and southern parts.

In Amherst Province, in Pegu and Arracan, the monsoon is a deluge, pouring, with little intermission, during five or six months, a quantity of rain down, which finds its parallel in few parts of the globe. But clearing up towards the end of November, it scarcely ever rains the next following five months, and the heat in April is sometimes suffocating.

In Mergui Province, on the contrary, the climate approaches the equatorial regions; it rains at least every fortnight throughout the greatest part of the year, the monsoon still exists, but it is milder and shorter, the intervals of fine weather much longer.

Formation of Amherst Province.

Respecting the formation of the country, the province of Amherst differs widely from the others. The provinces of Ye, Tavoy, and Mergui, are pretty much the same.

Amherst Province is a detached part of the great alluvial plain of Pegu, which, Bengal excepted, has no equal in the known parts of Asia.

The other parts of Tenasserim.

Ye, Tavoy, and Mergui (and seemingly the whole of the peninsula of Malacca) are a mountainous country, intersected by valleys which are separated by long-stretched, uniform, parallel-running ridges, including high table-lands towards the centre; and terminating in low plains or swamps on the sea coast under the influence of the tides, in localities where the ridges do not touch the sea.

General aspect.

The general aspect of the country is an uninterrupted dense forest, the number of climbers extending from tree to tree, the variety of creepers and the imperviable rattan palms increasing towards the south.

Increasing difficulties towards the south of penetrating the country.

In Ava Proper, we are told, the penetrating of forests is not obstructed by serious difficulties. In latitude 17, the thick brushwood, the creepers on the ground, and the sharp cutting rushes cause already difficulties—in latitude 15, the number of gigantic climbers forming labyrinths of networks increase the difficulties—in latitude 10, chiefly in low grounds, the thorny rattan palms, added to the former obstructions together with a mass of thorny cisalpinias, render the difficulties almost insuperable.

In the lower parts of the Tenasserim, and to the south of Mergui, the country can be only crossed in boats navigating the numerous nullahs and creeks.

Cleared lands and cultivation.

Cleared land is very scarce and only in the immediate vicinity of the villages; cleared patches of some miles' extent only near the chief places of Ye, Tavoy, Pallou, and Mergui.

The best cultivation is round Tavoy, and to the southward of that town as far as Tavoy Point; the most fertile cultivated spot is the valley of Taunbiauk.

The interior.

The interior is entirely waste, some straggling Carean hamlets and the newly established Christian Carean congregation of Metamis

excepted, which latter is the nearest village bordering on the Siamese territories.

As late as four years ago the eastern or left side of the Tenasserim did not count a single inhabitant ; now some few isolated houses are to be found there, and their numbers begin to increase rapidly.

Uninhabited.

The interior of the country south of Mergui, and beyond the village of Tenasserim belonging to the British territory, is totally uninhabited. All the country which has been made accessible by the assiduity and industry of man, when a short time neglected or abandoned, is instantly reclaimed by the unconstrained power of nature. The sites of large cities flourishing before the conquest of Alompra (1755) can scarcely be traced at present.

The country must be for a century under the unremitted influence of increasing population, cultivation and civilization, before the features of the country will be changed, and before all its peculiarities and curiosities can be made known.

II.

NATURAL DIVISION OF THE COUNTRY.

I.—MANGROVE BELTS.

ALMOST the whole coast, where not a bold promontory protrudes, and where the accumulation of land is gradual, is lined with a belt of mangroves forming a powerful bulwark against the inroads of the sea.

Mangroves protecting the coast against the inroads of the sea.

Rocks are driven asunder by the fury of the tempest, and their mighty fragments lay scattered over large extents along the beach; the impetuosity of the waves, repeating their action during thousands of years, undermines the hills and mountains along the sea coast, and smooths the granite to a huge pebble. The mangrove, feeble but pliant, a powerful tutor of the soft mud over which it stands, remains unaltered; it does not give up any of its territories,—nay, grasps with its advancing roots at every matter, holds it firm, and adds to the extent of the country gradually but certainly.

Their proper locality.

The mangroves in their greatest perfection are a production peculiar to the inter-equatorial regions, and lose their vigour beyond the 20th degree of latitude. The number of shrubs and trees constituting this family increases towards the equator.

Their peculiarities.

The mangrove lands are imperviable—they are one mass of soft alluvium protected by a network of most fantastically-looking roots of the mangroves standing above the ground. These lands are intersected by innumerable small canals through which, when the tide rises, the water enters, and through which, in the contrary case, it again recedes. At high water the whole is inundated.

Mangroves on the Hinzai basin.

A great extent of mangrove forests is at the Hinzai basin, where they occupy a semicircle round a bay of 10 to 15 miles in breadth, leaving only a small exit for the large river.

At the Palouk and Palou rivers I saw them in high perfection, but the greatest extent of them is at the mouth of the Tenasserim river, and mangrove lands will I imagine be the chief constituents of the numerous inner islands to the south of Mergui.

Compared with mangroves in Bengal.

In Lower Bengal this kind of country equally exists, only the number of species is much more limited. In fact, these tracts could be properly denominated the Sunderbunds of Tenasserim.

Growing in perfection.

Mangrove forests do not thrive well in pure salt water, but want brackish water; the mangrove forests are therefore always to be found in perfection at the mouths of large rivers.

The immense mass of water at the mouths of the Ganges and Megna, mixed with the sea water of the Bay of Bengal, originated the Sunderbunds below Calcutta: to the great number of rivers in the Tenasserim provinces the great belts of mangroves to be met here are to be ascribed, especially to the numerous mouths of the Tenasserim, the numerous low mangrove islands to the south of Mergui to a conjunction of seventeen small rivers the great extent of mangroves near the Hinzai. Owing to the comparative scarcity of rivers on the Coromandel coast, the mangrove belts are there much scarcer, and sandy beaches, a rarity on the Tenasserim coast, occupy their place. At the mouths of great rivers.

The great extent of the mangrove territory has hitherto not been appropriated to any use, except in the immediate neighbourhood of Mergui, where the wood is used as fuel. It is a general opinion that the wood is the best for burning. Use. Their wood.

The ashes of mangrove trees contain but a small proportion of potash, whose substitute in their composition is nitron. Their ashes.

The bark of the mangroves contains a considerable proportion of tannin, not yet appropriated to any use, except by the natives to tar their fishing nets, but is a valuable substitute for oak bark. Their bark.

A great portion of the mangrove ground can be rendered very profitable by planting nipah trees, which is however scarcely ever done. Besides preparing ground for Nipah cultivation.

Vide Vegetable Products.

II.—ALLUVIAL PLAINS.

The territory of the three rivers, the Salween, Gyne, and Attaran, which unite before Moulmain in one magnificent stream, is an uninterrupted mass of alluvial soil, almost without exception highly fertile, and therefore naturally chiefly adapted to the growth of that most important and necessary production of the tropics—rice. In Amherst Province almost exclusively.

The other parts of the Tenasserim provinces being mountainous, they possess much less of flat country which can be regularly inundated for the purposes of rice-growing. In the other parts scarcer.

The population however could increase more than ten-fold, and enough of plains could be cleared, fit for rice cultivation, chiefly not far from the sea coast and along the banks of the rivers. Yet more than used at present.

The greatest alluvial plain now under cultivation, fit for rice crops, is round Tavoy and to the southward of Tavoy as far as Pieboo ghee, which corresponds almost with the parallel of Tavoy Point. It is that part which is the less cultivated, the best peopled, and most prosperous in all the provinces. Alluvial plains in Tavoy Province.

Large plains of alluvium exist between Amherst and Ye, very rich soil round Lamain, and on the banks of the Ye river. In Ye Province.

From Jingnary to the southward, the first large plains to be met with are near Palou, which village has a considerable extent of them cleared and annually planted. Near Palou.

Along the banks of the Tenasserim.

On both sides of the Tenasserim, 15 miles up from Mergui, large tracts of alluvium equally rich are to be met with, and I am informed that they continue far to the southward; yet only a small part of them is cleared.

Mergui Province has hitherto produced such a small quantity of rice that though the number of inhabitants does not exceed 23,000, yet the supply has not been found sufficient, and grain is imported annually from Moulmain.

That part of the alluvial plains which is sufficiently elevated to permit the water to flow off, is much more neglected than the lower land. Excepting small patches for gardens, none is cleared. It is the best suited for the introduction of annual plants, such as tobacco, sesamum oil, indigo, and sugar.

III.—SANDY PLAINS.

Sandy plains to the north of Tavoy.

Sandy plains are rather scarce in the provinces. I know only of one instance. This plain is situated to the north of Tavoy not far from the village of No-bos-lay. It consists of loose sand, combined however with a good percentage of argillaceous matter, and is therefore not unproductive. It has probably formed, at a not very remote period, a part of the sea, which retired. The vegetation upon it is scanty, part of it being cleared, and I suppose it has been once cultivated. It could be used as pasture ground for sheep.

Nature.

At Mergui.

That part of the island of Mergui which fronts the island of Madrameean is white sand intermixed with large pebbles.

The sand is impregnated with tin ore.

IV.—INTERMEDIATE ARABLE LANDS.

How constituted.

Turning from the sea coast towards the interior, the ground becomes elevated; the influence of the tides consequently diminishes and ceases entirely in that part where the first lower hills begin to intersect the country. Numerous small rivulets descend from the valleys formed by the parallelly ascending hills. This intermediate country is highly fertile by the accumulation of humus through ages, and therefore adapted for a great variety of tropical cultivation chiefly of a perennial nature, which do not endure the overflow of the annual inundations, though they require a certain degree of moisture throughout the year.

Highly fertile in consequence of accumulation of humus.

Adapted for perennial tropical productions.

Teak forests belong to this division.

In the upper part of the provinces between Ye and Amherst, this tract of country comprises exclusively all the teak forests to the south of Moulmain.

It produces timber in the greatest abundance and highest perfection.

The forest belts at the foot of the Himalayas compared

That part of the country which is denominated in Upper Hindoostan the forest belt chiefly at the foot of the Himalayas, and which there is renowned and dreaded as the most unhealthy territory, as the pestilential generator of malaria and jungle fever, the

same part is in the Tenasserim Provinces innocuous, or at least equally healthy with the other parts of the country. The native wood-cutters, and even Europeans accustomed to the woods, stand the climate well even during the worst part of the monsoon.

with the tracts of land in the Tenasserim Provinces belonging to the division.

V.—INLAND VALLEYS.

The nature of the country and soil is the same with the arable intermediate lands, only with the difference that those border on the sea, these belong to the inlands.

There is a great number of broad inland valleys, each stream giving origin to one of more or less extent. The greatest of all is the valley of the Tenasserim, of more than 200 miles extent, which contains many thousand acres of the very best land, though as yet without a single inhabitant.

The valley of the Tenasserim.

The valleys originated by the Attaran, Tavoy, Ye and Palou rivers, and those of the Bain Khiaung and Kamaung-thueg Khiaung, are the next in importance.

And others.

VI.—INLAND BASINS AND SLOPES.

The lowest or first range always, and sometimes the second, are composed of isolated or detached hills, which surround the neighbouring country and form a kind of basin, whose centre and sloping lower sides are generally highly fertile.

This is the part of the country which is selected by the Careans for their cultivation and which yields all the mountain rice cultivated in the provinces, besides cotton, tobacco, hemp, vegetables, and the other few necessaries of this laborious people.

Selected by the Karcans for their cultivation.

The beautiful specimen of this division, in fact the most productive tract in all the country and the best cultivated spot in the southern provinces, is the Towngbiaun basin producing chiefly areca-nuts, betel vines and durian fruits. That territory is divided into about eighty compartments, each tenanted by one family, and the distant slopes occupied by Careans. The view of this great inland basin from one of the surrounding mountains is pleasing and gratifying as much as tropical agricultural scenery can be.

Inland basin of Towngbiaun.

VII.—GRAZING OR PASTURAL GROUNDS.

There is a strip of country between Ye and Tavoy, and another of greater extent between Ye and Lamain and to the North-East of that last village, which consists of a number of successive small hills composed chiefly of old red sandstone impregnated with much iron.

In the northern parts between Amherst and Tavoy.

There the luxuriant growth of trees ceases; the number of smaller plants chiefly of the numerous creepers and climbers diminishes. But instead of these everywhere the woods had been burnt or cleared, a thick gazon of tender grass springs up and covers the surface.

In the southern province of Mergui there are no tracts of equal nature; the moisture, divided more equally throughout the year, is more congenial to the development of vascular plants.

But in the Province Ye, chiefly towards the inlands near the Lamain District, the tender grass attains the height of 12 to 15 feet; any demand for hay for the Military Commissariat at Madras could be supplied from thence at a cheap rate: with the assistance of some hydraulic presses it could be formed into bales fit for shipping.

VIII.—UNPRODUCTIVE HILLS.

Their composition and productions.

A portion of the land just now described is deprived of humus and other decomposed fertilizing earths, instead of which bare siliceous fragments cover the surface—such land produces but dwarfish bamboo and a comparatively small number of trees, whose growth is checked. Detached patches of several miles length but of small breadth are to be found between Ye and Tavoy, and between Pim-bioo-ghee Pai and Palou. These hills are always near the sea. In the interior none of this description are to be found.

Mergui island.

Approaching towards the south, the hills of the same nature become more productive on account of the more equal division of moisture throughout the year. Part of the Mergui island near the town is composed of a succession of such hills, which are however covered with short verdure, chiefly juncaceous plants, throughout the year.

Hills containing iron near Tavoy.

The iron hills near Tavoy belong to the same division. These are very dry, barren, and covered chiefly with thorny brushwood.

IX.—BAMBOO LANDS.

Many of the smaller hills are not formed of sandstone, but of argillaceous schist covered with the humus which has been deposited by lapsed centuries, formerly occupied by forests, which subsequently have been pretty well exterminated by the intrusion of bamboo.

Changing localities towards the south.

They are widely spread between Ye and Tavoy where I travelled two days through an uninterrupted bamboo forest. They occupy on the Attaran the space between the second and third range; towards the south, the quantity of bamboo lands of this description diminishes, the bamboo retires then more towards the interior, and occupies greater heights. In that high table-land which contains the coal fields, bamboo forests spread over a great extent of the country.

X.—HIGH TABLE-LANDS.

High table-lands.

These do not exist at all in Amherst Province, which is a low plain, encircled to the north and east by an extensive chain of mountains.

High table-lands do not exist in Ye Province, which is an accumulation of mountains and valleys without plains, except those towards the sea-shore, of little elevation.

High table-lands begin in Tavoy Province near Kalley Aung, and the river Tenasserim runs through part of them. The general notion of a high ridge of mountains forming the eastern frontier of the British Possessions, as delineated in all known charts, is incorrect. The highest range in the southern provinces is 30 to 40 miles from the sea-coast, and then descending towards the east and traversing a hilly country we arrive at an elevated high-land, which extends sometimes beyond the supposed British frontiers, or terminates in another hilly country ascending towards the east. Begin in Tavoy Province. Their extent.

Isolated mountain systems spring up in these elevated plains, and in many parts they are diversified by valleys and dales, but the chief feature of the country, Tenasserim, is a high table-land.

The coal is imbedded in it, and many more fields yet undiscovered will probably be found in this division of lands.

XI.—MOUNTAIN LAND.

Except part of the province of Amherst, the rest of the provinces may be called mountainous.

There are three parallel running ridges in a direction from N. N. W. to S. S. E. which give the general features to the country. Mountain ridges.

Their height varies from 3,000 to 4,500 feet; the last range, nearest to the sea-coast, scarcely ever exceeds 500. Their height.

The mountains decrease in height towards the southernmost parts.

These great ridges give rise and birth to the different other sections above alluded to.

Amongst the isolated mountains, the Zadee, and Nor-bos-lay-town, between Tavoy and Ye, are the most conspicuous; the Dzay-town, 30 miles to the east of Ye, is the most famous, sacred and mysterious of all. The high ridge of mountains parallel to the Palouk river between Tavoy and Mergui is the highest; none however, as far as I had opportunity to ascertain, higher than 5,000 feet. Highest isolated mountains

The mountains forming the N. E. frontier of Amherst Province, the Elephant-tail mountains, are much more elevated.

The highest stack of mountains is beyond the British territories in the parallel of the Three Pagodas.

One of the most beautiful sights I ever enjoyed was visiting that famous pass. It is a high table-land, upon which again a number of mountain ridges is planted. I ascended one solitary limestone rock, lying to the north of the three heaps of stones indicating the former site of the Three Pagodas. The view from thence, though exhibiting no snowy peaks or glaciers, was, in Sublime scenery.

many respects, grander than the scenery in Switzerland, in the Appenines, or the Jura Alps. It was an unbounded view, ridges after ridges in succeeding lines running in the same direction, emerged one above the other: in the Siamese territories, I counted eight different chains, and these were either uninterrupted ranges or broken fantastically-shaped heaps of intermixed limestone, cones and peaks, presenting an amphitheatre of 60 miles in breadth, the horizon crowned by a faintly-contoured ridge of about 11,000 feet elevation, beyond which I fancied that the valley of the great and mysterious Menam must wind.

III.

RIVERS AND THEIR GEOGRAPHICAL DISTRIBUTION.

The river territories in that tract of country which I visited are four :— Division of river territories.

I.—Territory of rivers running towards the great plain of Amherst Province.

II.—Territory of rivers discharging themselves directly in the Bay of Bengal without combining previously (*viz.*, separated river territories).

III.—Territory of rivers forming the Hinzai Bay.

IV.—Territory of rivers originated beyond the great ridge of mountains situated within the British territories.

RIVER TERRITORY.

I.

The Attaran.

The Attaran is the only river of consequence which, running in a direction from S. E. to N. W., empties itself before Moulmain in that great sweet water basin at Martaban, formed by the confluence of the Salween, Gyne and Attaran. Course of the Attaran.

The river Attaran is a deep but narrow river, 40 miles above Moulmain, accessible to vessels of some burden. Higher up, divided into two, of which the largest assumes the name of Zamie Khiaung ; it remains navigable for 40 miles more, but the strong current renders the ascent difficult. Assuming the name of Zamie Khiaung.

Beyond the Nat-Khiaung very seldom anybody navigates except the cutters in the teak forests, for the best teak is floated down from the upper Attaran and its tributaries above Nat-Khiaung. The river then divides into several branches, of which I visited one after the other, without, however, following the course of each separately. There are five rivers, each 30 to 40 yards broad, but shallow and fordable, which come from the mountains to form the Zamie Khiaung. Seldom visited beyond Nat-Khiaung.

They have separate names, but these are varying and used promiscuously, and generally they are designated by the names upper, lower, higher, first, second, last, Zamie Khiaung. The branch called the Mickeli Khiaung is about 60 yards broad and very rapid. It is considered the source of the Attaran, flows through the pass of the Three Pagodas, and is navigable for canoes to the foot of the pass. Different denomination.

The length of the course of the Attaran has been always undervalued. Most maps fixed the source of it near the Three Pagodas Its source.

within the British domains, but it cannot be less than from 20 to 30 miles further to the eastward in Siam, and cannot be far from the geographical river territory of the Menam. Ascending the highest mountain near the Three Pagodas, I saw distinctly the valley of one of the Attaran tributaries some 20 miles off.

Extent of the British possessions to judge from river territories.

If the source of the rivers discharging themselves into the Bay of Bengal shall be considered as the frontier of the British and Siamese territories, then it is a great probability that the first ought to be extended from 30 to 40 miles farther to the eastward; but this is a question which probably will not be agitated before the lapse of several generations. These sub-alpine countries are now entirely uninhabited, claimed by nobody, and a degree of uncertainty will prevail for a long time respecting the boundaries of the east and west.

II.

The Ye River.

The sub-alpine part of the country before mentioned, stretching to the eastward of the Three Pagodas and some 60 miles to the south, is apparently the most elevated stock of mountains.

Common stock of mountains containing the sources of the most important rivers.

From this descends four considerable rivers, discharging their waters into the Bay of Bengal, two of which belong to this division (of the Attaran we have already treated), and the last belongs to the inland territory of the Tenasserim.

The Ye river has its source not far from that of the Attaran, equally beyond the supposed British boundary. It receives the greatest part of its tributaries from the north and east of Ye, few from the south; its course is comparatively short, and it is only navigable within the influence of the tides.

The Tavoy River.

The Tavoy river has for a length of time a narrow valley of its own and descends from N. N. E. to S. S. W., gathering its tributaries from the mountains on both sides.

Course

Its course in the upper part is very much obstructed—it continues to be navigable for large boats some 30 miles above the influence of the tides. At Tavoy it is between 300 to 400 yards broad and navigable for vessels of 200 tons burthen. Below Tavoy it extends rapidly and enters the sea at Tavoy Point, having attained a breadth of several miles.

Rivers to the south.

The number of rivers to the south of Tavoy is great, but few are considerable, and none of them comes from a distance farther

than 50 miles. Those which unite themselves with the Tavoy river in its lower course are the subsequent.

The Wambaloo,

following a very tortuous course through the alluvial plains near Tavoy, and enriching the rice fields annually by its inundation with highly fertilizing deposits. Wambaloo.

The Taunbiauk river,

which has its source in the Kiauk-town stock of mountains and runs through the fertile valley of Taunbiauk. It is there formed by the confluence of numerous river torrents, such as the— Taunbiauk.

Pioo-khiaung,	Man-than-khiaung
Pai-kay-khiaung,	Kjauk-taung-khiaung,
Wun-khioun-khiaung,	Wa-khiaung,
Ja-nee-khiaung,	and others.

The Taunbiauk river has at its mouth the width of about half a mile, and is at high water navigable as far as the valley of Taunbiauk. It is of great advantage to the inhabitants of that part, they being able to bring upon it all their produce into the Tavoy river and from thence to the bazaar of Tavoy. Importance of the Taunbiauk river.

Between the Tavoy and Taunbiauk rivers are several others of 100, 200 and 300 yards width in the alluvial plains, all with extensive mud banks, which render their appearance at low water very odious. Other rivers.

Over all these wooden bridges are erected, but most of them in a bad state. The travelling by land with beasts of burthen is on this account exceedingly difficult and dangerous, as they cannot be permitted to pass over the decayed bridges.

At present, however, bridges are not much required, as few people travel to any considerable distance by land, but always along the sea-coast in boats, all villages being built on navigable rivers and creeks; and the inhabitants of two villages in direct line, scarcely two miles distant, communicate with each other by means of canoes, preferring to make a circuit of 20 miles to the direct foot-paths. All produce is in the same way transported. The most considerable of these rivers between the Tavoy and Taunbiauk river are the Tha-pin-khiaung and the Pjow-khiaung; but the number of all is nine. Scarcity of land travelling.

From the Taunbiauk river to the Palou-khiaung the number is more limited; but the rivers are more considerable, and generally 35 miles inland navigable for canoes. Rivers to the south of Taunbiauk.

These are the—

Thanjeen-khiaung,	Pa-louk-khiaung,
Pa-khiaung,	Pjee-kja-khiaung,
Wado-khiaung,	Palou-khiaung,

The last three are the most important. I do not know the number

and extent of rivers between Palou and Mergui, as I did not visit that part of the country, but went inland in search of the Great Tenasserim. I am, however, informed that there are some not inconsiderable streams to the north of Mergui.

III.

The Rivers of the Hinzai Basin.

Hinzai basin. There is a territory between Ye and Tavoy which is peculiarly remarkable. The country slopes from all sides towards a central point forming the semi-circle of a great cone, the lower part of which is a sweet water basin, which empties itself through a narrow opening into the sea.

Safe harbour. This is the Hinzai cove, one of the safest and finest harbours on the whole coast, provided that there is no bar at the entrance, which I had no means to ascertain. It is about 15 miles long by 6 to 8 broad, surrounded by land on all sides except an opening of half a mile breadth. The country about is entirely uninhabited: some turtle egg searchers from Tavoy come occasionally there and stop along the sandy beach lined with casuarina trees—localities which the turtles greatly like.

Hitherto unknown. The bay has been hitherto unknown to Europeans; the survey of the coast has only been made from the sea-side, and the entrance to it has probably been considered the opening of one of the numerous rivers, as the sight of the inner bay is shut out by elevated hills.

Rivers contributing to form this basin. This fresh-water basin is formed by the confluence of all the creeks between Ye and Tavoy (excepting the Hangan rivulet, turning into the Ye river, and the Zadi river, which empties itself directly into the sea), descending from the westernmost ranges. The creeks and rivulets concurring to form this bay are in number 18, their names the following:—

Podain-khiaung, Ma-gna-khiaung,
Mum-daing-khia-khiaung, Ka-nyai-khiaung
Da-ni-khiaung, Nat-khi-dzjn-khiaung,

which, all uniting before they enter the Hinzai basin, form the Majan-khiaung;

Paun-dain-khiaung, Pa-dain-khiaung,
Ma-khiaung, Tzheen-tzuch-khiaung,
Tzee-goun-khiaung, Kha-lo-khiaung,
Nan-ta-zoak-khiaung,

coming all either from the north or east; then the

Myn-tha-khiaung, Aim-dia-zua-khiaung,
Tzeen-phan-khiaung, Ko-phe-rouk-khiaung,
Tshaun-zaun-khiaung,

which come either from the south-east or south.

The last or Ko-phe-rouk-khiaung is the most considerable of all.

IV.

Rivers uniting themselves with the Tenasserim.

The river Tenasserim is the most considerable in the southern provinces, and that which of all others in the British Possessions on the coast runs through the greatest extent of land; it ought to be therefore the most important, yet it is of all the least known, and its whole length, as far as it is navigable, has never been visited by any European. Tenasserim river.

The reason is, that it is an inland stream, running 300 miles through mountainous country, formerly quite unfrequented; the lower part, however, on account of the eminent fertility of the soil, begins to be cultivated since the British occupation by Careans, Siamese and Burmese. Excepting the site of the old town of Tenasserim and the new settlement of Metamio there is, properly speaking, not one single village along its whole course—Mergui itself is situated at the mouth of one of its branches. Its lower parts begin to be cultivated.

I had an opportunity to visit its higher parts to the distance of 150 miles from the sea, ascending also 100 miles of the Little Tenasserim, which is another large stream uniting with the former at the site of the old town of Tenasserim.

The Tenasserim itself is formed by the confluence of the Bain-khiaung and the Kamaung-theug-khiaung at Metamio, which is a Christian Carean establishment founded by the American Baptist Missionaries four years ago on the site of an old walled Siamese town, which, according to tradition, was the capital of an independent State. Rivers forming the Tenasserim.

The Bain-khiaung.

The Bain-khiaung has its origin in latitude 13° 31′ in one of the high mountain stocks which traverses the country from N. by W. to S. by E. Origin of the Bain-khiaung.

The river, after being swelled by sixteen mountain torrents (running the whole course from S. to N. by W.), meets at Metamio latitude 14° 11′ another stream, the Kamaung-thueg-khiaung, which comes almost directly from north, and forms in conjunction with the latter the Upper Tenasserim. The Bain-khiaung before Metamio has the breadth of about 55 yards at low water.

The names of the rivulets running into the Bain-khiaung, beginning from its source, are the following:— Rivulets forming the Bain-khiaung.

1. Left side . . . . Laka-phioo-khiaung.
2. „ . . . . Ye-poo-khiaung.
3. Right side . . . Kiauk-town-khiaung.
4. Left side . . . . Tha-phioo-khiaung.
5. Right side . . . Tha-pl-pho-khiaung.

6.	Left side . . .	Mounai-too-khiaung.
7.	Right side . . .	Jance-khiaung.
8.	Left side	Zheen-zuay-khiaung.
9.	„	Khiauk-po-khiaung.
10.	„	Pya-khiaung.
11.	Right side . . .	Haing-kamait-khiaung.
12.	„	Ye-poo-tha-khiaung.
13.	Left side . . .	Taung-to-khiaung.
14.	Right side . . .	Ja-nee-khiaung.
15.	Left side . . .	Gna-zuoy-khiaung.
16.	„ . . .	Tida-khiaung.

The Kamaung-thueg-khiaung.

Supposed source.

The Kamaung-thueg-khiaung has never been traced to its source, which is supposed to be to the north, not far from the high stock which gives birth to the Attaran, Ye and Tavoy rivers in the latitude of Ye. It is asserted by natives (Careans) that it runs parallel with the Tavoy river, both being divided only by a moderately elevated range of mountains. I ascended it 20 miles up from Metamio and found it an insignificant shallow river, scarcely navigable for boats at low water, but very much extended during the monsoon.

Country where the two rivers unite.

The country where these two rivers unite forming the Upper Tenasserim is mountainous; the river is there enclosed by steep banks and hills of moderate elevation: the river bed is a succession of rocks and rapids. There is plenty of water even in the dry season, but the navigation is at present very intricate. Careans are known who have passed down its whole length upon rafts and were twenty days in reaching Mergui.

Tributaries.

The tributaries which the Tenasserim gets in its higher part are not known, but are probably insignificant; for 80 miles below, in latitude 13° 12′, where I penetrated from Mergui, I found the mass of water scarcely augmented. The first 35 miles from Metamio the river runs almost constantly east, but turns afterwards directly to south, uniting with the Little Tenasserim in latitude 12° 5′, from where it turns in a N. W. direction towards the sea for the remainder of its course, which is 41 miles.

The Little Tenasserim.

Source of the Little Tenasserim.

The Little Tenasserim comes directly from S. E. It is at the village of Tenasserim 118 yards broad, and has been traced by me almost to its source, a distance of about 116 miles.

The chart of it made by Mr. Hutchinson of the Madras Artillery gives a correct outline of it on a large scale.

This chart having been forwarded with my report about the coal, a descriptoin of it would be unnecessary.

Survey of the mouths of the Tenasserim.

The numerous mouths of the Tenasserim river will be soon perfectly known. Captain Lloyd, the H. C. Surveyor General, is at present occupied in surveying them, and farther remarks here would therefore be superfluous.

The reasons why the Tenasserim will be in time the most important of all the rivers:

The Tenasserim will become in time the most important river in the provinces.

Containing a tin ore;

Its upper part, chiefly round Metamio, is rich in tin ore, which will and must become an article of exportation, and it will be found cheaper to bring it the long distance by water to Mergui instead of transporting it by land over the high mountains through the difficult passes to Tavoy.

Gold;

Its lower tributaries contain gold. Though it may be a doubtful question whether the washing of it can be a profitable employment, yet no doubt the mere knowledge of the existence of gold will probably attract adventurers to it.

Sapan-wood;

The Tenasserim is the only river on the banks of which the sapan-wood forests occur (within the British boundaries). It is but a small slip of land which produces spontaneously the valuable dye wood, the part 13° 30′ being the southern and 14° 4′ its northern extremity. The reason why it should just select this intermediate tract is not obvious, as the nature of the country seems to be pretty uniform from Metamio to the Ye-khiaung, where the country begins to be more level.

Except the solitary Carean wanderer who is well acquainted with its unenlivened banks, the sapan-wood-cutters are the only people who ever ascend the stream so far, and this only during the short time from June to September, when they float the wood down on rafts. A more improved system in cutting and cultivating of the sapan-wood on places where it has been formerly growing and is now almost exterminated, will render the Tenasserim much more important.

Excellent timber;

The tallest and best timber grows on its banks throughout its extent. When the time will arrive that the value of the timber will be more understood—it is of course natural that localities affording facilities for transport will be the first selected—the long course of the Tenasserim will afford, in the first instance, inexhaustible supplies.

The banks being highly fertile;

The fertility of the banks between the Ye-poo-khiaung and the old town of Tenasserim, and on both sides of the Little Tenasserim, renders that part important to persons desirous to engage in agricultural pursuits; it is considered by the Burmese and Careans themselves the most fertile part in the province, the Towngbiaun valley excepted. Yet it has been entirely deserted. Before the occupation of the country by the British, nobody dared to settle there, being liable to lose not only the fruits of his exertions, but to be himself kidnapped by the Siamese and sold as a slave.

Recently, chiefly since the last four to six years, large tracts begin to be cleared, not only by the Careans who are here to be considered as the forerunners of human enterprise, not only by the Burmese who are the naturalized population, but by the emigrants from Siam who settle all in this district, and also by some of the enterprising Chinese who have penetrated so far, finding agriculture even more profitable than the lucrative trade which they hitherto exclusively monopolized on the sea-coast.

Passage for the coal.

Finally, the discovery of coal on the banks of a tributary of the Tenasserim must soon change the lower parts of the river between Tenasserim and Mergui; now almost uninterrupted forests, they will change into scenes of human industry; the number of men which the coal transport will require, the mass of victuals which these will consume, and perhaps the opening of a new communication of mercantile importance with Siam, will produce these changes.

It has therefore the appearance that the Tenasserim, hitherto the most neglected and most unknown of the great rivers, may become in course of time the best explored, the best cultivated, and most productive part of the southern provinces.

River territory to the south of Mergui.

There is another river territory to be mentioned which comprises the streams discharging themselves into the sea between Mergui and the St. Mathew's river, the southernmost boundary of the provinces, of which, however, I am unable to give any details, having not yet visited that part of the country.

IV.

GEOLOGICAL NOTES.

Geological theories.

Great part of geologists acknowledge now the fact in the history of the earth—

a.—That there have been long periods of comparative repose, and that there have been periods of extraordinary violence or revolutions, during each of which a great number of mountain chains have been formed;

b.—That all the chains thrown up by a particular revolution have a uniform direction, running parallel to each other, even in remote regions;

c.—That the instantaneous elevation of great mountain masses must create a violent agitation of the waters, and may be the reason of the dismemberment of a part of a continent and of the formation of an archipelago of islands.

Direction of mountain ridges.

The country from latitude 17° to latitude 11°, which I visited, presents a most interesting phenomenon, namely, that almost all of the great mountain ridges run in one and the same direction from N. 10 W. to S. 50 E., or in the same direction in which we find the course of the Peninsula indicated in a common map.

These mountains are long-stretched ridges, frequently interrupted; of different height, and sometimes double, triple, quadruple and more, with intervening valleys or table-lands.

Their formation.

Most, perhaps all, of these mountain ridges belong to one and the same period of formation. They are either primitive or transitive rocks, chiefly gneiss, mica schist, and hornblende schist as far as about the 14th degree of latitude, and then exhibiting either a jointed and slaty structure, or thick beds, resembling strata of deposition, transitory greywacke either in thick beds, *viz.*, oldest fossiliferous group, or passing into the flaggy beds.

Archipelago of Mergui.

I regret that I could not visit either the sea-coast or the islands, I am therefore totally ignorant of their formation.

The Archipelago of Mergui, composed of about 2,000 islands, forms one of the most beautiful scenery imaginable, and in variety, can only be surpassed, I think, by the Archipelago of Korea. Almost all the islands are uninhabited, none cultivated, and all, except some solitary rocks, overgrown with timber. It would be interesting to have this quite unknown labyrinth examined, and it would be interesting to determine if these islands are the upheavings from the sea during one of the great revolutions, or if they are the detached remains of a former main land.

Volcanic action.

That volcanic action must have affected in recent times this part more than once proves the neighbourhood of that mighty

volcanic band of the Molucca and Sunda Islands, which band begins somewhere to the north of the Philippines (perhaps as high up as the Aleutian Islands), occupies Gilolo, Booro, Ceram and Banda, sends a branch towards New Guinea, and passes over Flores, to the probable central stock at Sumbava, from where, after passing through Java and Sumatra, it extends to the Bay of Bengal, and apparently loses itself in Barren Island, which stands a constantly burning volcano, an awful sentinel in the parallel of Mergui, scarcely five degrees to the west from that town, or it goes, as the late Mr. Foley has shown, over to Arracan, and from thence up to Assam. It is impossible to imagine that this immense volcanic band should have no direct influence upon the Tenasserim Provinces. I have not observed in any part of the provinces any recent plutonic rocks, nor have I heard of earthquakes and their devastations. This is, however, no proof. The smallest part of the country is geologically examined, the greatest part of the country uninhabited, and the people have no written historical records, nay traditions older than three generations are very seldom met with.

Hot springs.

But I suppose that continuing volcanic action manifests itself indirectly, but clearly enough, in the existence of the numerous hot springs met with throughout the country. There are eighteen places known to me where hot springs exist. The most considerable are those near the Attaran, those near Pay, those near Metamio on the Upper, and those on the Ye-pu-khiaung on the Lower Tenasserim.

But they are to be found throughout the country. Frequently in wading through small rivulets on my overland journey when in want of a better road, the barefoot walking people exclaimed suddenly that the water got hot. It was in consequence of small hot springs penetrating through the rocks, the warm water mixing with the cold, that the stream became tepid to some distance, until it assumed again its former degree of temperature.

Hot Springs on the Attaran.

Examination of the hot springs on the Attaran.

There are ten hot springs or rather hot water ponds, of which I could only examine the nearest, as the access to the others was through deep water of 130° Fahrenheit. This one was a semicircular pond of about 50 feet in circumference. In one place it was 35 feet deep, but I could only measure the depth round the borders. It was perfectly calm; except in one or two places, where a slight ebullition took place, small thin patches of siliceous incrustation intermixed with confervas and tremellas swam on the surface. The air above the spring was 97½° and the water itself 146° Fahrenheit; notwithstanding this high temperature, the borders are deeply covered with vegetation, and a species of ficus had actually its roots in the water. The story, however, of fishes being found in the water seems to border on the fabulous.

The ground round the springs is strongly impregnated with iron, and the water which runs over the ochry mud has a strong styptic taste. The temperature of the muddy ground at a quarter of a mile from the springs was raised more than ten degrees, and near the springs it was almost too hot for the barefooted coolies to bear it. The quantity of carbonic acid which the springs evolve seems to render (notwithstanding the excessive heat) the neighbourhood peculiarly adapted and susceptible to afford nourishment to vegetable life, hence the increasing luxuriance of the vegetation, almost impenetrable, approaching the hot springs. Evolution of carbonic acid.

The hot springs on the Attaran are the only instance where I met them in a plain perfectly level; all the other springs I visited were in the interior, on the slopes of what I called inland basins, in more mountainous regions or on the banks of torrents and rivulets.

All the springs which I examined were uniformly composed and belonged to the class of sulphureous mineral waters tinged slightly with chalybeate, like the water of Brighton. The springs on the Attaran approach in their composition nearest to the celebrated waters of Tœplitz. The greatest difference in their general composition consists chiefly in the absence or presence of quantities of the sulphates of magnesia and lime. Chymical composition.

We may be inclined to believe either the central heat or the chymical agency or electricity as the source of volcanic heat, the hot springs are the manifestation of their existence, and experience has placed it beyond doubt that an intimate connexion exists of hot springs with earthquakes and volcanic eruptions. (*N. B.* For instance, the intimate connexion of the Sprudel at Carlsbad in Bohemia with the eruptions of Vesuvius.) So we may assume as correct that the numerous hot springs in this country are in intimate connexion with the volcanic system which pervades the Indian Archipelago, and to use an ordinary but intelligible phrase, that they are some of the distant air-holes through which the constantly regenerated, either gaseous or precipitated, substances escape. Theory of these thermal springs.

That earthquakes are either unknown or exceedingly rare in these parts is no proof either of the absence or distance of volcanic action, for only obstruction to the discharge of volcanic heat and to the exit of highly expansible gases may give rise to an earthquake or eruption.

How many vents for the discharge of gaseous bodies may yet exist unknown in the provinces, and how many more may exist in the adjacent seas?

The progress of geology has pretty accurately ascertained that mineral springs in general are the most abundant in volcanic regions, and the general origin of thermal springs seems to be that they are originally columns of steam condensed before reaching the surface by coming in contact with other strata filled with cold water. Intimate connection of hot springs with volcanic action.

The columns of steam, however, can only ascend in parts where at a certain depth subterraneous heat is active, that is, within the territory of volcanic action; it seems to me therefore a proof that the volcanic action, known to be constantly operating in the neighbouring Moluccas, extends under the surface over a great part of the Tenasserim Provinces, the most northern thermal springs being in latitude 16° near Amherst.

Use of the thermal springs.

In a civilized and more densely peopled country these thermal springs would be of importance, and afford medical assistance to multitudes. But here centuries will elapse before any use of them will be made; much more as their situation is generally far inland, generally in sequestered spots in the depths of the forests, where very seldom any human being penetrates.

Medical properties.

Their medical properties would render them excellent remedies in a number of cutaneous diseases which are common among the natives, chiefly among the Careans, probably contracted by the effects of uncleanness, as they are accustomed to wear the same cloth without ever removing or washing it until it falls in rags. Liver complaints in this country, however, by far less frequent than in Hindoostan Proper, would equally find a powerful remedy in them.

The most important those near Amherst.

The hot springs near Moulmain on the Attaran will probably be the first which will excite attention, and if Amherst should be selected as a resort for invalids from India, they could easily be turned to advantage.

In a direct line, they would be only four to five hours distant, and a road could be cut through the country without difficulty, so that patients could be removed there, and could bathe in loco.

Effects taken internally.

Their effects, taken copiously internally, ought to be tried, and it would perhaps be no bad speculation for an enterprising man to bottle the water and bring it to Calcutta and Madras, from whence it could be easily diffused throughout the country for the benefit of those who labour under liver complaints.

Increase of land.

It is unnecessary to mention the vast deposits on the deltas of rivers in general; the power of running waters carrying with them every day acres of land being sufficiently known to produce

On a large scale.

vast extensions of transported land. In this part of the globe these phenomena operate on the grandest scale. The deltas of the Ganges, Burhampooter, Irrawaddy and Moulmain rivers are constant demonstrations of the increase of alluvial territory.

But small rivers form their deltas as well as streams which carry the deposits thousands of miles—small rivers which, in other not tropical parts, would scarcely effect a visible change on their mouths for centuries.

Marine forests. Agents of increase of land.

The reason of this operation is an agent unknown to temperate climes, and hitherto not sufficiently studied and appreciated by geologists—the marine forests. (See natural division of the country *d*. Mangrove belts.)

A peculiar natural family of trees and shrubs (though belonging, if their fructification be examined, to different botanical families) occupies the shores of the sea coast near the deltas of the rivers.

Distinctions of the trees and shrubs constituting the marine forest.

They are distinguished from all other vegetable productions—

a.—They grow only in brackish water, never farther than the influence of salt water reaches (the lower part).

b.—They want to be daily overflown by water.

c.—They have all thick succulent or coriæceus leaves.

d.—They are evergreens.

e.—If burnt to ashes, yield, instead of potash, soda.

f.—Contain in their bark a strong astringent matter.

g.—They have differently formed roots from other plants, which extend above the soil, and some of which grow upwards instead of downwards.

h.—If dried like other botanical specimens they fall in pieces.

[*N. B.*—In species they are the most numerous near the Equator, are the chief walls which surround a great part of Sumatra, and are still numerous on this coast. (I have collected hitherto 17 species): at Moulmain the number of species diminished, but not so the number of individuals; the Sunderbunds near Calcutta are much poorer in species.]

How do they arrest the deposits?

These peculiar productions (some of them 10 inches in diameter, whose roots stretch as far as 40 to 50 paces from the trunk) are the natural and indeed the best fortifications of the terra firma in low ground, and they are the chief reason of the accumulation of new land near the sea, growing thickly together, generally impermeable to men. Each species displays its roots under a peculiar angle or curve, forming a labyrinth of holes and passages at low water several feet above ground. The mud carried in suspension by the stream down is caught in the net-work, where the currents are interrupted, and is deposited. This daily-repeated phenomenon produces a vast quantity of sediment, which increases the land, and the mangroves operate so quickly that one generation is sufficient to perceive the changes.

Different operation in not tropical climate.

In other not tropical parts the sediments of the rivers are carried into the sea and form the extensive banks, which in narrow inland seas will terminate as in the German or Baltic sea to form extensive banks, to render other parts shallow, to create partly morasses, and finally to fill up whole estuaries.

Meanwhile here the marine forests do not permit much of the suspended particles to escape, and remain in the same time the best fortification of the sediment.

Final contribution when decaying.

But these trees contribute not only to form swamps and morasses, they tend to create fertile and solid land. The violence of the monsoon carries annually from the higher lands a mass of vegetable and mineral débris, part of which covers the first deposits of silt.

The soil loses gradually its saline properties the more it is covered by detached humus. Terrestrial plants begin to thrive and give an impulse to the generation of more humus, and the marine forest trees, the first generation of the new lands, die. They seem to have fulfilled their destination, and when decaying, their fallen trunks, their rotten roots give the last tribute to that work, for the accomplishment of which they seem to have been exclusively created.

Geological structure.

Primitive or transitive formations.

The higher mountains of Tenasserim belong chiefly to the primitive or to the transitory systems, being either but rarely unstratified rocks or inferior stratified non-fossiliferous, or belonging to the grauwacke group. The carboniferous group is confined to the parts containing isolated mountain limestone chain; coal measures have been discovered in the southernmost parts.

Granite.

Unstratified granite, comparatively speaking, is not common. Between Ye and Tavoy large tracts of sienite are to be found, and in the granite district at the Hinzai basin short rocks constitute important masses. Beautiful pieces of tourmaline, resembling those from St. Gothard, are found there.

The diallage rocks, so common in Ava Proper, have not been traced to the southward. Greenstone is on the confines of Amherst and Ye Province, in large masses, where chiefly the Zhen-taun district contains much of porphyritic greenstone.

No unstratified rocks belonging to the plutonic section have in any part been seen by me.

Inferior stratified rocks.

The same rocks which occupy such a considerable area in Central India, and are the chief constituents of the Himalayas, are here the most common. They seem to be the chief basis of passage. Ceylon, as far as it is known, is chiefly composed of them.

Gneiss is the most common in the most elevated parts.

The No-bos-lay chain towards Kallee-oung is composed of protogyne, the substitution of steatite for mica is alternating. Mica slate is almost as common as gneiss. It is the chief constituent of a great chain towards the Three Pagodas, and of the Malue mountains.

The eastern ranges toward Thum-lo, between the Kamaung-thueg-khiaung, and the secondary ranges between which the Bain Khiaung is included, consist exclusively of hornblende slate.

Talcose slate is throughout, but in detached patches, visible.

Argillaceous or clay slate of this and of the grauwacke series is a common companion in the valleys and declivities through the province.

Chlorite slate is more in the northern parts.

Quartz rocks.

Quartz rocks occur interstratified with the above-mentioned rocks, chiefly with mica slate and gneiss. They appear isolated

between Tavoy and Metamio, where they form a barren ground of several miles extent.

N. B.—It has been said that formerly gold was found there, and it is not improbable that the quartz is auriferous. I found crystals of iron imbedded, but no gold.

On the top of the Zadee-taung.

The top of the Zadee-taung between Ye and Tavoy contains huge masses of quartz. This is the only mountain known to me which has a bare top, the forests formerly covering it having accidentally been destroyed by fire in consequence of lightning. The white masses of quartz are visible from the sea at a distance of 30 miles.

Grauwacke.

A great part of the steep banks of the Tenasserim consists uniformly of grauwacke slate and transition of limestone, as far as from the Na-tha-mi-khiaung to the Ye-poo-khiaung, lower down the territory belongs to more recent formations.

Difficulties of examining the country geologically.

To examine the country geologically it would require years. The difficulties encountered cannot be imagined by a European or even by an Indian who is accustomed only to scenery where trees are either out of the question, or welcome ornamentally. Neither the Nilgherries or the Himalayas offer great difficulties to the observer; but here where a bare rock is one of the greatest rarities, geology can only be prosecuted along the banks of steep rivers and traversing the fissures created by mountain torrents chiefly after the monsoon.

V.

ORES AND OTHER MINERAL PRODUCTIONS.

Great mineral riches.

In a country which is chiefly composed of primitive, transitive and secondary rocks, the occurrence of ores is to be expected in greater abundance. The knowledge hitherto obtained of its mineral riches corroborates sufficiently the supposition how much more is to be expected from a thorough investigation.

IRON.

Iron the most common metal.

Iron undoubtedly is the most common mineral throughout the provinces, being found in one or the other form almost everywhere. The quality of iron, however, improves in the southern parts, and the sites of iron ore are much more favourably situated than those indicated in my first report from Amherst Province.

Its territory.

The chief iron territory is between Ye and Tavoy not far from the sea coast, in the tertiary hills. The ore is in manifold forms, beginning from red ochre to the solid loadstone rocks. Seventeen localities have been noted down by me between Moulmain and Tavoy. The best however of all in point of quantity, quality and locality, is the iron ore near Tavoy, an hour distant from the town, on the road from No-bos-lay.

Forms.

It occurs there in two forms. 1.—Octohedral, common magnetic iron ore. Massive in granular concretions, crystallized, splendent, metallic, highly magnetic with polarity.

It occurs in a bed of unknown magnitude, a block protruding above the ground is 6 feet high and 15 feet in diameter at its base.

The existence of this ore has been known to the Burmese before, but as much as I know, has never been worked; its magnetic properties have been considered a matter of mystery and curiosity.

It is known that this iron yields the best bar iron, and that the percentage of ore is the highest known, being considered peroxyd. 69 and protoxyd. 31, yielding at an average 85 to 87 of smelted iron.

Great bed of rhomboidal iron ore.

Not far from this is another bed of iron of apparently great magnitude, having been traced by me over a considerable surface; in fact, it seems to constitute entirely a hill of 40 feet in height, 400 feet in breadth, and 2,000 feet in length. Rolled smooth pieces from 2 to 20 pound weight are seen scattered over the ground. It appears in another form from the first, *i. e.*, massive rhomboidal iron ore.

Other forms.

The chain of lower mountains, which runs along the sea coast to Tavoy Point, contains throughout iron, chiefly in the forms of prismatic iron ore and in the ochry compact and fibrous form.

Brown clay iron and conchoidal log iron ore is the most common in all the tracts from Ye to Mergui.

Red ochre is in several places on the Tenasserim. To the south of the Island of Madramee, veins of an iron ore occur, whose constituents are besides iron, copper, lead, and arsenic.

Iron pyrites are to be found in all forms. Hexahedral iron pyrites were brought from the islands and considered gold.

Prismatic iron pyrites accompany the upper stratum of the coal to the southward of Mergui.

An extensive vein of cellular iron pyrites occurs near Metamio. It has been suspected in the time of the Siamese to be gold, and its conversion into that noble metal has been repeatedly tried.

Of all the iron ores, that of Tavoy is the most important. The Tavoy iron the best.

The hill containing the iron is 24 miles distant from the river. The space from the hill to the river is occupied by rice fields, a few feet above the level of high water. The river itself is accessible to vessels of 200 tons burden to that place.

A canal from the river edge to the hill could be dug out with little expense and the ore transported there. On the water edge the smelting furnace ought to be established, fed either by fuel brought down from the upper parts of the river, where wood is in the greatest abundance, or supplied with coal from Mergui.

Considering all the iron localities known hitherto in India, there is none which combines all the advantages which can be expected from a similar undertaking in so eminent a degree.

The site of the iron ores near Tavoy just now related renders it unnecessary to expatiate upon the other localities, as they never could compete with this.

TIN.

Tin ore is the second in importance. It is even more generally diffused in the southern parts of the provinces than iron, though in much more limited quantities to be had, and though generally diffused, there are not many localities in which it has been found yielding such a percentage which would render its working a profitable speculation. Tin generally diffused.

In the northern parts tin is very rare. In Amherst Province I found only one locality where it is disseminated.

Its territory begins to the south of Ye from Kallee-oung; its central stock seems to be parallel to Tavoy, continuing to the south, probably extending through the whole of the Peninsula, until it passes over to the Indian Archipelago, where its bank and its environs contain the richest tin mines hitherto known, for tin has been or is still collected in Mergui, Junk-Ceylon, and in many parts of Proper Malacca. Its geographical extension.

Tin of Metamio.

Sites. The tin occurs here along the foot of a range of primitive mountains of from 2,000 to 4,000 feet in height, partly in the hills formed from the débris of rocks constituting the main range, partly in the alluvial soil of the intervening valleys deposited there during thousands of years, partly in the small rivulets and rivers running through the valleys and annually washed down during the monsoon.

Sources. There is no doubt that the original sources are tin floors imbedded in the main range, though none have hitherto been discovered. This however is very little to be wondered at, as a great part of these mountains have never been visited and the tin mines do not lay openly exposed, and even if they did, the dense vegetation prevents a closer examination, and they remain hidden unless met with by accident.

I found several times on or close to the surface a small number of quartz blocks amongst the débris of former ages, containing small tin crystals enclosed in the stony matri, but the quantity of tin contained in them is very inconsiderable.

Form and geological formation of the localities. By far the greatest part of the tin is intimately connected with the sandy and earthy particles constituting the above-mentioned hills; it seems however to be very unequally disseminated. It is not covered by a stratum of a more recent formation, but occurs in the soil on the very surface, a proof that its being carried down from the original stock continues to this day—how deep it extends is not known, but it must occupy considerable depths, to judge from the general formation. Some of the old pits worked in the Burmese time are 40 feet deep. The tin occurs in very small grains, varying from the minutest particles to the weight of eight grains; larger pieces are very seldom met with. I am however informed that crystals of the size of a pigeon's egg were occasionally found.

Thickness of strata containing tin.

Extent and aspect of the Metamio tin tracts. This tract of country, of which the latitude of Tavoy forms the centre, is about 60 miles long and from 8 to 12 miles broad, the hills containing it sometimes 500 feet above the intervening valleys, and the whole has the aspect of an undulatory oblique descent, the inclining side turned towards east, the greatest part of the rivulets containing tin running into the river territory of the Upper Tenasserim. It is to be observed that in this latitude the whole of the western side bordering on the Bay of Bengal is comparatively poor in tin, which leads to the conclusion that the original beds are to be looked for on its eastern side.

Experiments with the soil. Ascertaining the percentage. Experiments with the soil gathered in different localities (but everywhere collected only near the surface) shewed a percentage varying from one to seven per cent. of tin oxyde. Three per cent. is generally considered pretty fair, six and more very good,

considering the comparatively small trouble and expense which its extraction causes.

Tin of Palou and Womboo.

To the southward the tin approaches more the sea coast and becomes still more generally diffused, but in the British Provinces the percentage towards the sea coast diminishes. The extent of the two tin districts has not been ascertained. In Womboo (to the north of Mergui) a considerable vein has been latterly discovered. Occurrence throughout the same as just now described.

Tin diminishes towards the sea coast.

Tin of Mergui.

On the island upon which Mergui is built tin equally occurs which has been formerly worked, and has been always considered private property or benefice of the Miocoun, or Town Governor; its percentage, as far as I could ascertain, is however very small, the highest half per cent. It occurs with a white quartzose sand intermixed with large pebbles, and lower than the level of the sea.

Small percentage on Mergui Island.

All the hills in the neighbourhood are scarcely 80 feet high, and it remains an unsettled question how and from whence it has been brought to this place.

Tin in the coal river.

The mountains to the south of Mergui from which the river issues, which runs through the coal field, contain equally tin, and as far as I could observe, in some abundance; the percentage in the rivulets varies from two to four, at a distance of 4 miles from the source. In the time of the extraction of coal, the tin of these parts will be probably turned to use.

Percentage not yet ascertained.

Tin from the islands.

Finally I must mention that tin upon the islands will probably be of no rare occurrence. I did not visit any of them, and mention only what I heard related, adding that it is very possible that some of the great ridges upon King's Island, Domel, &c., may often be the sources, without excluding however the Flat Islands. There are no mountains upon Mergui Island, and it is known that in Junk-Ceylon the tin has been extracted from perfectly level land.

Occurrence upon the islands not yet positively known.

In general I observed that the soil consisting of a brick red colour, composed chiefly of decomposed mica, the richest, the more prevalent argilla or felspar is, the less the tin occurs; there is however no variety of soil which does not contain tin. Black humus ground is the poorest in tin ore—the mountain rice fields of the Careans near Metamio contain sometimes from one-half to one per cent.

Outward appearance of the soil containing tin varies.

In the Burmese time considerable quantities of tin ore were washed out by compulsory labour, and the inhabitants of Tavoy,

Tin works in the times of the Burmese.

but, chiefly the Careans belonging to that province, were employed to obtain it. The working of the tin for the benefit of the Burman Emperor has been continued for several centuries, and if we may judge from the extent of so many miles where the surface has been turned up, the vestiges of which are visible in many places, it is certain that many thousands of men must have been occupied to effect it.

Burmese methods to extract tin.

The Burmese method of extracting tin is very rude. They either dig canals or rather small drains intersecting the surface, or they form a perpendicular wall of 10 or 12 feet high with a drain on its basis, or they excavate pits varying from 6 to 40 feet in depth. The water during the monsoon washes out a considerable part of the earth from the sides, the lighter earth is carried away, and the tin, on account of its specific gravity, remains at the bottom of the drains or pits.

After the monsoon the mass remaining at the bottom is collected, and, in small flat wooden vessels turned by manual labour, washed out. The tin grains, obtained by this method, are pretty well cleaned from the earthy substance.

How they work at present.

The above-described methods of working are now almost entirely abandoned on account of the want of a certain number of men to work together. Some Careans, however, being on the banks of the rivulets containing tin, and some few people from Tavoy, work too, but they are only occupied with the washing out of the sand in the creeks, which is less rich than the soil in the higher parts, but they do not know how to treat the latter in the dry season. I met such a party of people in the Tavoy mountains; their only machinery or instrument was a large tortoise shell. One man walked in the deepest part of a rivulet, trampled the mud under his feet, and after the stream had carried away the turbid water, he filled his shell with the fine sand at the bottom, and separated by constant turning and addition of water the lighter sandy and earthy particles from the tin ore which remained at the bottom. He gained by this in about five minutes from 20 to 60 grains weight of tin oxyde, which might contain 50 per cent. of pure metal. The people calculate that even by this very imperfect method, a man can earn about half a rupee's worth in one day, a pretty high profit; but the people have so little inducement to gain money, that only very few occupy themselves in this way, and these I am told are elderly men, with whom it has become a habit, who, about 15 years ago, were the Burmese Emperor's chief workmen.

Profits not inconsiderable.

People however indolent.

Quality of the tin.

The tin mines of this country form, after European nomenclature, what is called in Cornwall, stream works.

From stream works.

It is known that the tin obtained from these mines is the best, and the superiority of the tin from the Banka Islands is to be

ascribed to the circumstance that almost all is washed by stream works. For this reason the Cornish tin and that from St. Just are considered the best in Europe.

Compared with ore occurring in tin floors.

Besides it is known that all tin occurring in tin floors is deteriorated either by arsenic or bismuth, wolfram, copper, and iron, and the process of separation is sometimes a laborious one, requiring previous mechanical diminution, roasting, additional flux raffination, &c., while the stream work tin is generally free from all other minerals, and the whole process a simple reduction of the oxyde.

Which of the localities in Tenasserim is the best. Metamio tin. Disadvantages of locality.

Amongst all the localities known to me, that of Metamio would be the most preferable for working the tin on a large scale. On account of its high percentage, if undertaken with perfect machinery, it promises to be a profitable undertaking, it has however the great drawback, *viz.*, that it has a tedious land carriage to Tavoy. It is about 40 miles distant from thence, and the only pass through the mountains is very rough, narrow and precipitous.

How to be overcome.

The construction of a road would require a great outlay. Elephants would be perhaps most advantageously employed. Metamio could furnish rice and other necessaries of life for the establishment. It is unnecessary to add that a steam engine directing the whole establishment would be of the greatest use; there is however water enough; the neighbourhood of the great chain of mountains nourishes small streams throughout the year, which could be easily united and directed to the working plan. Wood, as everywhere, is in the greatest abundance. From Tavoy being a seaport, the transport is of course *ad libitum*. Singapore and Calcutta would be, for the present, the best markets.

GOLD.

Gold is pretty generally diffused in the country, but nowhere as far as I am aware in any quantity to excite the exertions or the cupidity of the natives, and the thirst after gold is much less than would be generally expected from a semi-civilized people, who always prefer becoming wealthy by a sudden effort than by continued steady industry.

Gold in the sand of rivers.

The gold occurring in the country is nowhere found in gangues or imbedded in a matrix, but is found in the sand of the minor rivers, the primary source being in general unknown; whether it comes from the high mountains or whether it is washed out from the alluvial lands, like great part of the gold in Mexico, must for the present remain an undecided question.

Localities. Operations of the Siamese there near Kallee-oung.

In the province of Amherst gold seems not to be found. The northernmost part in which I discovered traces of it, are the small tributaries of the Lamain river. In the forests of Kallee-oung, gold may be plentiful, chiefly in the Siamese territories, eastward from Kallee-oung. This year the Siamese made preparation to dig

gold on a large scale, and provisions of rice were laid in for several months—but whether it was really for the purpose of working gold, or pretence in order to have an advanced post, watching the proceedings in the British territories at the time of the expected Burmese invasion, I of course do not know.

I did not discover any gold in the province of Tavoy. Its chief territory seems to be to the eastward of the Tenasserim river with its source probably beyond the British territories. Almost all the small rivers coming from thence contain gold, always however in very small quantity.

Tenasserim the only place where gold is now extracted.

The only place where hitherto gold is washed, is on the site of the old town of Tenasserim. The natives dig holes in the ground during the monsoon and clean the earth on the spot. This is therefore gold gathered from alluvial land and not from the sand of the river. The natives do not believe that it is gold in the state of nature, but think it to be the remains of ornaments of the old and rich inhabitants from the time before Alompra's invasion—accidentally finding sometimes, it is said, a small plate of gold, chiefly in the form as it is used to gild the pagodas, by which their opinion seems to be corroborated. It is almost impossible to get information how much is obtained annually—all is conducted clandestinely and with mystery. I am however told that a person may gather during one season one or two annas weight. The Chinese in the place are very eager to buy it up.

Its value to Government.

The existence of gold mines to the State in general is of no great benefit. The easy extraction and the small bulk render smuggling exceedingly easy. It has been the case in America that, in latter times, gold mines scarcely yielded 3 per cent. to the State; it would be much more the case here where a control is almost impossible, and the Chinese are great adepts in nefarious clandestine transactions. But experience has taught that gold mines prove ruinous to private individuals, who invest their capital in such a speculation, for it has been justly observed that, though the prizes in this hazardous lottery are few and the blanks many, the price of a ticket is generally the whole fortune of a rich man. Should localities be found which promise a quick return, there is no doubt that if once known the gold will be much earlier extracted than the valuable iron and tin, for human avidity does not often follow the judgment of sober reason; however a wise Government, wishing to increase the capital of the country, will not give any great encouragement to the enterprize.

To private individuals.

PRECIOUS STONES.

Rubies and Turquoises.

I have not hitherto found any, but they may, I understand, be found within the Tenasserim provinces, in the territory to the eastward of the Tenasserim river, chiefly rubies and turquoises, and are

from time to time brought into the village of Tenasserim by some Careans, who are aware of their locality, and very anxious that nobody else should know it. The specimens I saw were very inferior, and chiefly a species of garnet, which it is usual to bury in the foundations of a pagoda, in the absence of more valuable jewels. Inferior garnets.

The proper site however of the precious stones, is said to be within the Siamese territories, in a dense jungle far from human habitations. Siamese repair semetimes from Bankouk there, and stay several weeks to wash the precious stones out of the clay, but the country around is infested by robbers, who watch the labourers and plunder and murder them frequently, if they have been successful in their researches. The place is a fortnight's distance from Tenasserim in a north-east direction. Mines of precious stones in the Siamese territories.

PORCELAIN EARTH.

Porcelain earth or China clay of different quality is in several parts of the provinces to be found, but generally too much tinged with red iron oxyde. Porcelain earth not uncommon.

On the banks of the Tenasserim, four days' journey above the town, there is however a very considerable layer, partly together with quartz and mica crystals, which seem to corroborate the opinion that kaolin owes its origin to felspar, and to other minerals intimately related to it.

Lower down, another layer is to be observed, which seems to be closely allied to the China stone or Cornish stone (a dissolved and changed granite) with a mixture of very much felspar, which latter completed its metamorphosis into China clay.

LIMESTONE.

The peculiar blue limestone ridges, which ornament the province of Amherst in such a conspicuous way, and ascend equally boldly in the great plains which border on the district of Ye, diminish towards the south by degrees, without however totally disappearing, and there is a famous limestone cave on the Tenasserim, eight days' journey from the old town. Limestone for building materials is very little used, except for the construction of pagodas (all the rest of the buildings being of wood), this, and the chunam which the people eat with their pawn, is chiefly burnt from shells found on the sea coast and on the river banks. Near Mergui there is an interesting formation, an accumulation of shells baked together, forming a considerable stratum, which when burnt furnishes pretty good lime. Limestone disappearing towards the south. Limestone cave. Lime used by the natives from shells.

SALTPETRE.

The above mentioned great limestone cave on the Tenasserim, one of the most interesting phenomena of nature in the provinces, is the habitation of thousands, and perhaps hundreds of thousands of bats. Their excrements cover the ground in many places one Excrements of bats in caves.

or two feet thick, and the decay of this gives origin to the formation of the nitrate of potash. It would be no great difficulty to generate a great quantity of saltpetre by the formation of artificial compositions left to the influence of the atmospheric air (*nitrières artificielles*) according to established and well known principles.

SULPHUR

Sulphur probably to be found on the volcanic islands.

Will be found in great quantities on Barren Island close to the Andamans, and upon other islands to the southward, on account of their volcanic nature, but not having visited them, I am unable to indicate the localities. Should it in course of time be considered worth while to produce sulphuric acid, the great quantities of iron pyrites could then be advantageously turned to use.

COAL.

Discovery of coal.

The researches after coal have been this season crowned with success. The comparative scarcity of available coal in India, and the annually rising importance of the material, rendered it very desirable that coal should be discovered in this country, which presents, comparatively speaking, a narrow strip of land, where land transport can nowhere be great, and where such an extent of sea coast permits an easy access to vessels. The geological formation of the northern and middle parts of the Tenasserim provinces is such, that there was little hope of finding coal in them. Towards the south however, the coal accompanying formations of the carboniferous series became conspicuous, and in the lower part of the Mergui province, coal was discovered in different localities, in systems or basins, apparently distinct from each other. It was ascertained that coal occupies a great area, for the two extreme points, where it was discovered, are distant three degrees from each other.

In the southern parts.

The first discoveries of no practical use.

None however of the first discovered localities promised to be of practical use, the quality being either inferior, of considerable specific gravity, intermixed with numerous iron pyrites, or the seams so very inconsiderable; and though there was hope that the lower strata might produce larger veins, yet the experiments would have been expensive and doubtful; but the last discovered locality combined all the desiderata required respecting quality, quantity, and easy access, only the distance from the sea coast throws some difficulty in the way, being from a river navigable throughout the year, 21 miles distant, from whence it is to the sea coast 68 miles. However, if compared with any other Indian locality, and if destined to supply the whole of the Indian seas with coal, it will be found that it carries for the present the superiority.

The last however important.

Enumeration of the localities.

The localities hitherto discovered are the following:—

1. On the large Tenasserim, nine days' journey from the village of Tenasserim, near the river Nan-thari-khiaung, 1½ miles inland. Variety of friable brown coal, impregnated with pyrites, three veins

in different localities,—the largest 16 inches in thickness—formation tertiary sandstone below, compact sandstone conglomerate, intermixed with large siliceous fragments above.

(*Discovered*, 17*th March* 1838.)

2. On the large Tenasserim, eight days' journey up from the village of Tenasserim, along the banks of the river, species lignite, in ¾ inch thick veins, altogether in sandstone below and above, undoubtedly belonging to the same system as No. 1.

(*Discovered*, 19*th March* 1838.)

3. On the Tenasserim above the Tarouk-khiaung two days' distance, variety bituminous shale. Large masses protruding into the river, apparently distinct from the first two.

(*Discovered*, 14*th April* 1838.)

4. Up the local river, a branch of the Little Tenasserim, five days above the town of Tenasserim, in a south-eastern direction.

Slaty coal—Specific gravity 1·26.

A vein 5 feet thick, 240 feet long, angle 20 degrees, turning upwards a section, visible on the banks of the river formation, above gray, below black clay slate, the lowest stratum apparently resting, to judge after the general features of the country, upon blue limestone.

5. Close to No. 4, and a continuation of it, an immense coal field of either slaty or conchoidal pitch coal or English cannel coal, highly bituminous without any concomitant of iron pyrites.

A succession of fifteen localities where the coal is visible on both sides of the river, which has evidently forced its way through it, turning up an angle of 25°, in most places six or more feet thick, resting before a stratum of clay slate.

(*Discovered*, 24*th April* 1838.)

Since that time I have been informed by natives, that not far from the localities Nos. 4 and 5, coal in two other places has been observed, and it is very probable that this coal field occupies an area of several miles, and localities might be discovered still more advantageously situated for transport.

The localities Nos. 4 and 5 being the most preferable of all respecting quantity, quality and easy access, I refrain from entering into particulars regarding Nos. 1, 2 and 3, which I suppose will never be worked, and are only interesting in a scientific point of view.

Description of the great coal field.

The last extensive coal field is from the others more than 200 miles distant, and seems to belong to a quite different system. It is situated in a high level table land, diversified by several isolated ranges of mountains from which issues the river which passess through the coal fields, and which ridges may be considered as the eastern boundary of the British possessions towards Siam.

In my precursory report to Government immediately after the discovery, I made a mistake in estimating the distance, which has been since positively ascertained by Colonel Macleod and Mr. Fell, I. N., whose chart is to be considered as much more correct than any other. The latitude is 11° 52′ 37″, the longitude not positively ascertained, the windings of the river constitute a distance of 121 miles from Mergui—the direct distance from Tenasserim is 29½ miles, direct distance from the coal field to the nearest part of the river—where it is the whole year navigable, is 22 miles—distance from Tenasserim to Mergui by the river is, measured by Captain Lloyd, 41 miles.

About coal mines in general.

With truth it has been said, that coals are the greatest blessing to England, and that coal in conjunction with iron form the basis of the present commercial prosperity of Great Britain. In our days their beneficial influence is equally manifest in Sweden, Germany and Belgium.

The stagnation of commerce and manufactures in Italy, Spain and Portugal is not owing alone to political mismanagement, but equally to the scarcity of wood and absence of coal. Scarcity of that fuel in India has retarded European enterprize and checked its commercial prosperity, and it was to be feared that the high price of coal would have the greatest detrimental influence upon the beginning and increasing steam communication, which it is satisfactory to think may now be overcome. That scarcity in Great Britain in knowing that an inexhaustible supply is still treasured up in the bowels of her earth, has not yet been experienced in India; nay to this day convenient situations for the exportation of coal in great plenty, and of acknowledged excellence, remained the great desideratum earnestly wished for.

Coal mines in India.

At Burdwan.

The Burdwan mines have hitherto been the only ones of practical consequence which rendered India partly independent of England, and facilitated the inland steam navigation on the Ganges, but their quality is very inferior. The quantity of ashes is between 77 to 18·4, on account of the great proportion of argillaceous earth combined with it.

For some purposes this high percentage of ashes is perhaps of no great objection, provided the fuel is comparatively cheaper to make up the loss of percentage of carbon; but if coal shall be employed for the purpose of steam navigation, it is of vital importance, chiefly for long passages with intervenient long stages, where the room filled up with coal is of the utmost consequence.

Cherra coal.

The Cherra coal in Sylhet, as far as it is known, is, according to the last report of the Coal Committee, good; but its locality is such that it may be yet doubtful if it can be rendered available for the Calcutta market, but certainly it will not be cheaper than

English coal for the Red Sea communication, and perhaps for no other part of India.

That Mr. Loch has succeeded to deliver 1,000 maunds at a comparative low price at Dinagepore, is not yet a proof that he would be able to procure a hundred thousand maunds at the same price. The high mountains which must be traversed before the coal can be delivered at a navigable river, the necessity to traverse different passes where, as the report states, scarcely bullocks or mules can be charged, but men must be stationed to receive the loads; all these difficulties are against the transport of any great quantity

The Palamow coal locality presents almost equal difficulties, *id est*, a protracted land carriage over difficult ground—it may indeed in time become available and valuable for the surrounding country, but I do not think that India at large will be greatly benefitted by it. Palamow coal.

The great distance from the sea is an equally great objection to the Assam coal, even were the localities at present known better situated than they are.

All the rest of the coal localities found in India, hitherto known, are of no practical use for the grand purpose—"general unlimited supply." Some on account of their locality, others on account of the small quantity, but the greatest number on account of their quality. These can never be worked and are like the silicified lignite No. 30 from Assam. All the varieties of friable brown coal Nos. 36, 37 and 38, the bituminous shale No. 52, &c. &c., and the greatest part of the other lignites and brown coals only for the sake of a system innumerable under the genus coals. The other localities.

Under these circumstances it will be easy to show that the locality of Mergui possesses advantages which none of the other situations can boast of. Advantages of the Mergui coal fields in preference to any other part in India.

Quality

Is one of the best known. Following the division of Dr. Jameson, it belongs to species black coal, sub-species cannel coal, massive resinous lustre fracture, conchoidal, or even fragments trapezoidal, brittle, specific gravity from 1·24 to 1·28. In the middle of the vein however it goes over in the sub-species pitch coal, and it is more bituminous than cannel coal usually is. It burns freely, with a reddish flame, evolves a great quantity of gas, is completely free from sulphur and iron pyrites; ranking next to the Kilkenny coal, it can be reckoned equal to the best English coals.

Quantity.

Though the extent is but very imperfectly known, it is yet established that it contains so much that there can be no fear of exhaustion for the next century.

The thickness of this upper stratum varies from 5 to 8½ feet, taking only 5½ feet thickness per average, one acre gives 8,437.

It is sufficient therefore to state that the coal has been almost uninterruptedly traced for about 4 miles, and the supply of the upper stratum can accordingly be estimated. But the last reports of natives prove that it is still more extensive; of the quantity which the lower strata may contain, we cannot of course judge; but it is for the present of no use to know that there is much more, whilst already so much is known, but if the upper stratum is already so rich, the lower strata must be still more so, if we are allowed to form a conclusion by analogy.

Access.

The coal is near the surface, the stratum covering it does nowhere, as far as it is known, exceed 25 feet, in many parts it is from 7 to 12, the dip about 20 degrees. The stratum above the coal consists of—

Bad slaty coal	...	6 inches.
Grey slate	...	6 „
Débris of slate with coarse gravel	...	2 feet.
Gravel and alluvium the rest.		

As long as the upper stratum is available, it seems that no expensive mining operations will be required.

In consequence of this, the complicated machinery for the removal of the water from greater depths will not be necessary; there will be no apprehension of the bad consequences of bad weather, (bihydroguret of carbon,) for the present it would be the best to follow the strata from whence they make their appearance. For this purpose the deviation of the course of the small river (which has opened the section of the banks) into another channel would be the most expeditious. In several parts it rolls just over the coal, and when the water is removed, there is no surface at all to be cleared away.

In future, of course, the common operations necessary in every coal pit will be required in the beginning; this situation however ensures a great saving of capital.

Transport.

The river traversing the coal fields originates in the neighbouring mountains, and is at the coal fields only 15 to 25 yards broad, and part of the year nearly dry; but during 5 months of the year, according to native reports, navigable for rafts. (The natives go annually from Mergui and Siam into the neighbouring mountains above the coal, to cut a sweet-scented wood called Kalamay, which is an article of commerce in Ava and Bankouk, and are acquainted with the navigation.) I ascended it in the month of April before

the monsoon set in, on rafts, and came within 3 hours' distance or about 9 miles from the coal-fields.

Passing the level table-land, the river enters a hilly country; at first in a south-west direction, and then west by north until it reaches another river coming from the south. From hence the river is navigable throughout the year for boats; the influence of the tide becomes perceptible, the river having attained a breadth of 60 to 80 yards at low water, and runs chiefly in a north-by-east direction to Tenasserim (a distance of 40 miles), entering there the large Tenasserim, accessible for vessels of 200 tons' burden; the distance from thence to the sea is 41 miles.

There is no difficulty of transporting a limited quantity entirely by water direct from the coal place to the sea, employing in the first instance rafts made from the very extensive bamboo forests growing on the spot. The coal must then be ready for transport immediately the water rises. Should the bamboo not be sufficient, wooden planks made up in form of flats to hold a greater quantity than rafts, can be employed, but the high price of labour will render it impossible to deliver the coal cheaper than four annas and a half the maund at Mergui, a great number of people being required to direct the rafts.

If however Tenasserim is destined, as it likely will be, to supply the whole of India with coal, these expedients will be found insufficient; neither bamboo nor wood can be found in such quantities as to float down about 50,000 or more tons per annum. The bringing back of the same rafts is out of the question on account of the heavy expense and the difficulties in the last 50 miles; railroad or tram way therefore on wooden foundations cutting across to the nearest spot where the river is throughout the year navigable (a distance of 21 miles) will be found the safest and in the end the cheapest.

Wood sufficient will be found everywhere a few paces from the road, and any iron rails required could be made from the Tavoy iron mines.

The cost of this rail or tram road would not, I expect, be great, and at first might be of the rudest description, and the outlay of capital, may it be to whatever extent, would bring in a remunerating and certain percentage. Before the railroad would be completed, land carriage in carts would be found cheaper than the transport by water, presuming that large quantities are required.

In this way any quantity of coal could be furnished at the cheapest rate in Mergui.

The country through which the road would have to run has not yet been surveyed; it is however known that it runs chiefly through plains and smaller hills.

Locality of Mergui.

The locality of Mergui merits particularly to be examined with respect to the interior, with the view of having here a general depôt for coal.

Anticipating that comprehensive steam communication will eventually be established, the locality of Mergui is more favourable than any in Bengal, for the other parts of India cannot be taken into consideration because they do not yet furnish any available coal. If Point de Galle be chosen as the central point, Mergui can supply that depôt with any quantity in a very short time. In the favourable season the distance is only eight or ten days' sail from Mergui, the steamers plying between Ceylon and the West Coast of India can, in going up to Bombay, be supplied with coal from Point de Galle, also Madras can equally well be directly supplied from Mergui, the distance being almost the same as to Ceylon.

To provide the lower parts of the Red Sea (Mocha and Judda) and Bombay with coal, it will be found that Tenasserim or Mergui coal will of course be got much cheaper than coal brought from England; the same is to be said of the Persian Gulf, if steam navigation shall be continued in that quarter.

Whether it would be cheaper to take coal from Mergui to Suez, instead of transporting it from Cairo, experience alone can teach. I suppose, however, that if the newly-discovered coal mines at Beyrout in Syria, continue to yield great quantities, the coal from these, if favoured with the assistance of Mohomed Ali, will be found cheaper than the Mergui coal.

Should the second scheme of a steam navigation with England, *vid* Mauritius and the Cape, come to maturity, Mergui coal can be advantageously employed as far as the Cape, at any rate it must be preferable to the proposition newly started in England to provide the Island of Mauritius and the adjacent parts with New South Wales coal.

The eastern coast of the Bay of Bengal of course will use only Mergui coal, because here it is in loco, but it will be also exclusively used in the Straits, and as Point de Galle is the western central point between Europe, South Africa and Hindoostan, so Singapore is the eastern central point between Bengal, China and New Holland (through the Torres Straits). It will therefore be perceived that Mergui has just that admirable situation, to be able to pour out the indispensable article in all directions, the two most important central points, Point de Galle and Singapore, being so near to it.

Further demonstration of the importance of the Mergui coal-fields.

Further it may be observed:—

a.—That a renewed intercourse with the Dutch possessions may perhaps take place, the steamers in Batavia finding it cheaper to be supplied from Mergui with coal than elsewhere.

b.—That a project has been started some time ago in Calcutta to substitute small steam vessels to the clippers carrying on the less bulky trade with China, a project promising many advantages, chiefly to the speculators in opium. The scarcity of coal has been the greatest obstacle. But in supplying the steamers with fuel at Mergui or Singapore, the difficulties are obviated.

c.—That it is possible that besides the use of steam vessels, coal may in time be exported to Madras and other parts of the Carnatic, to serve as a substitute for wood in that part of India.

d.—That the discovery of the Mergui coal will have an influence upon the price of coal in Calcutta, and although it may always be dearer than Burdwan coal, it may yet be carried there for the purposes for which only English coal can be used, and especially if coal gas is ever required. It is also expected to be of great use in the large reverberating furnaces of the Government Gun Foundry, in which a strong flame is required.

The beneficial influences of the discovery of good coal for the Tenasserim Provinces are therefore apparent; another important consequence to which the discovery of the coal-field on the Siamese frontier gives rise to, is perhaps the following.

VI.

Overland Communication with China.

Dissertation about the advantages of a shortened road to China.

The question has been some 30 years ago started, how far it would be practicable, and how far it would be advantageous to establish a communication across the Peninsula at the Isthmus of Kraw between the Bay of Bengal and the Gulf of Siam. The advantages for commerce by shortening the distances of communication in any part of the world require no demonstration.

The British trade of India with Canton has been deemed sufficiently important to excite the desire of having the communication as quick as possible. The question is indeed one of great importance, not only on account of the increase of commerce in general, but on account of the occasionally precarious nature of the relations with China. Speedy communication therefore between the seat of the Indian empire and that commercial emporium must always be of great consequence. Is it desirable therefore to have a quick communication only by way of letters; or is it sufficiently important to shorten the road to China also for merchandize? In the first case, a communication overland by dak would be sufficient, and without farther reference the shortest road will be chosen, in the second case the navigation of convenient rivers on both sides of the Malayan Peninsula, to be united either by way of railroad or canal, will be required.

The Isthmus of Kraw.

Forest, I think, was the first who recommended the Isthmus of Kraw; Hamilton was of the same opinion; and Colonel Burney was a warm advocate for that plan; all based upon the native reports, that there are two rivers running in parallel directions, the St. Mathew's or Pack-chan river, discharging its waters into the Bay of Bengal, the other the Tom-fong, running into the Bay of Siam near the Larchin Islands; that at the height of the monsoon their waters almost unite, and that the distance from one river to the other never exceeds six hours' walk, the intervenient tract meriting scarcely the name of mountainous.

I had no opportunity to visit the St. Mathew's river nor any part of the territory belonging to the Siamese; notwithstanding this I venture to suggest another proposition which seems to me more advantageous.

Proposition of an overland road across the Peninsula from Mergui.

I ascended from Mergui the river Tenasserim up to the old town of Tenasserim, and leaving the large river, navigated up another river, which led me finally to the discovery of the coal-fields, which I hope will produce an entire change in this uninhabited and hitherto unvisited country by Europeans. The description of the river and of the country has been already given, as far as it belongs to the British territory. Not having had the

permission to enter the Siamese territories, I had recourse to native reports, which state that the sea on the opposite side is only between 35 to 45 miles distant. What the nature of the country is I do not know, but I met near the frontier a party of Shans, who were accompanying a Siamese high priest back towards Bankouk; this priest came ostensibly for the purpose of visiting his relations, settled two years since within the British territories, but probably with the intention to report to his Government about the new Siamese villages. It was 7 o'clock in the morning, and his party said that they hoped to be in the evening at their boats on the Siamese side—this was on the 26th of April, consequently just before the monsoon, when the waters are at the lowest. Now, should the coal-fields above described be brought into the extensive use it is expected they eventually will be, and a rail or a train way be made from the navigable part of the Tenasserim river to the coal-field, a communication will at once be carried on to almost the highest part dividing the two seas and approaching the Siamese Gulf within 30 or 40 miles, at the same time, meeting in the same parallel within perhaps 15 miles a navigable river, the passage across the Malayan Peninsula would be completed with ease and expedition for the purpose of communication with China. Objections might indeed be raised on the part of the Siamese Government, but which it is to be hoped would perhaps, just now easier than ever, be overcome. The Siamese at first might be induced to permit a free passage to letters through a post office established in one of the villages near the sea, and allow perhaps even their own people to transport, if necessary, coals overland to the opposite sea coast for steamers, if required, running between Canton and the east coast of the Peninsula, which might eventually lead to the accomplishment of all that could be wished.

Nature of the country and probable distance.

Objections on the part of the Siamese.

The establishment of human habitations (more than a thousand labourers being required in the coal-fields) would within a short time render the place known and of importance. The distance from any human habitation would in the first instance render victuals dear, but this would lead to the cultivation of the neighbourhood and gradually increase the number of inhabitants.*

Effects of working the coal-field.

The enterprizing Siamese will be easily induced to visit the establishment, and with little trouble it could be made the mart or fair of commerce between the two nations. They would bring stick-lac, sapan wood, sandal wood, aloes, gamboge, wax, honey, ivory, hides, oil of jessamine, benzoin, varnish, and cassiabuds, and

Upon the intercourse between the two nations.

* Within a short distance of the coal-fields, there stood formerly a large Siamese town, which appears to have been deserted at the time of Alompra's devastating march towards the capital of Siam in 1758. All vestiges of human habitations are however obliterated, and the place only indicated by some old fruit trees, and a large meadow in the midst of the deep forest.

would be glad to get in return muskets, powder, tobacco, opium, piece goods, cutlery, &c.

If vessels visit Mergui for the purpose of cargoes of coal, they will thus be glad to bring the above articles instead of arriving empty, and in consequence the prices of Europe and Indian goods at Mergui and on the coast would be much cheaper than they are or can be under present circumstances.

Order in 1688 to obtain possession of Tenasserim.

It is at the present moment a very interesting record in history, that in A. D. 1688, at a time when the first foundations were laid to the creation of the British empire in India, the Honourable the Court of Directors ordered their servants at Madras to endeavour to obtain possession of the town of Tenasserim from the King of Siam and to fortify it.

VII.

VEGETABLE KINGDOM.

PRODUCTIONS CULTIVATED IN THE SOUTHERN PROVINCES.

Rice.

Notes respecting rice cultivation.

The same observations which I made in my first report about the Province of Amherst respecting cultivation in general, and rice cultivation in particular, are applicable with reference to the southern provinces. The same slovenly cultivation in every respect (which leaves to a bountiful nature to do every thing, and which exerts itself only so far as to give to nature an opportunity to develop her bounty) takes place in Ye, Tavoy, Mergui and Tenasserim. The Burmese are bad cultivators, they are surpassed by all their neighbours, the Hindoos, the Siamese, the Malays and Chinese. Rice is much less produced in the southern parts. The reason is two-fold :—

Rice productions much less in the southern provinces.

1*st*.—The country is not so well adapted for it.

2*nd*.—The people cultivate more valuable productions not growing in the north, which give them the facility of exchanging them for rice.

The southern parts, destitute of that great rich alluvium land which constitutes the Province of Amherst, will never be equally productive; however, for the present population, or for treble the number, sufficient of good rice ground can be found chiefly at the deltas of the river, the Ye, Hinzai, Tavoy and its tributaries. Pye-khia, Palouk, Palou and Tenasserim rivers, have deposited in the lapse of ages a great quantity of alluvial land, the greatest part of which is waste and covered with forest.

Tavoy produces sufficiently for its own consumption. Mergui gets rice imported from Moulmain. The cultivation of rice however will never give that profit which other tropical cultivation does. Were it not an indispensable food to the people, they would not cultivate it in Mergui. The Ceylonese, or inhabitants of the islands, who cultivate none at all, being on a too low scale of civilzation to pursue agricultural labours, obtain it from Mergui through the Chinese in exchange for their productions.

Pegu and Amherst Province the proper rice country.

Pegu, Amherst Province and part of Tavoy, are so excessively productive in rice, that they seem by nature to be intended to be the granarium in the time of scarcity for India. In Amherst, and also in Tavoy, failures of crops are unknown, and a speculator in rice advancing a certain sum of money to the ryots, after having concluded a bargain, can always be sure to get the stipulated quantity.

Demand annually increasing.

The low prices in the preceding years depressed greatly the cultivation; this year however the demand was so great that all

grain was bought up, and Tavoy, which had formerly no exportation at all, was for the first time called upon to supply the rest.

The great drawback at present is the time lost before ten thousand baskets can be collected, there being no depôts in Moulmain; a great inconvenience consists equally in the slow operations of cleaning the rice from the husk, this altogether being performed by manual labour with hand mills, chiefly by women. Rice mills, after the American principle, used in Louisiana and New Orleans, would be of very great advantage.

Besides, the people do not know how to preserve the rice for a length of time, the Chittagong method not being at all practised. The Isle of France is for the present the chief place which is supplied from Moulmain.

The soil and climate of Penang and Singapore are such that they cannot compete with the rice production of the Tenasserim Provinces. Tavoy supplies Junk-Ceylon and the adjoining States, which barter tin for rice, the tin being brought from Tavoy by China junks to Calcutta. The petty States of Kedah, Perak, Patani, Ligor and Sangora produced formerly rice for exportation, but since they fell under foreign dominion, they have greatly fallen off, and import from Penang, which imports again from Moulmain, affording an increased stimulus for rice cultivation in Tenasserim. Should there be a more direct communication with China, intelligent Chinese pretend that Tenasserim rice in years of scarcity, which are unfrequent, would be a good exportation to China, if it could be obtained in great quantities, a remark equally applicable to India, and perhaps it would not be impossible to have Government rice grounds, which could be rented out, but where the tenants in years of scarcity would be obliged to furnish Government at a short warning with the requisite quantity,—in years of plenty they should have the liberty to dispose of a part or of the whole *ad libitum*, and to induce the ryots to cultivate these Government grounds, the tenants should be benefitted by particular privileges or a smaller land tax. In this way an immense quantity of paddy could be always ready for Government consumption. As it is necessary with every beneficial improvement, instead of demonstrating its advantages, to shew them practically, these Government landholders ought to be obliged to adopt the Indian and Chinese system of transplantation, for if a regular system of cultivation could be introduced, the quantity of rice would be raised upon the land far beyoud its present rate of productivity.

Tenasserim Provinces a granarium for India.

Cotton.

Cotton plantation very much neglected.

The cultivation of cotton is very much neglected in the southern provinces, nothing for sale being produced; the Careans plant the most for home consumption. At Metamio the American missionaries turned the attention of their flock towards the cultivation

of cotton, and the people of Tavoy buy or barter it from the Careans, each man carrying his load on his back through the mountain passes 40 and 50 miles distance.

The variety of cotton cultivated however is very inferior, compared with the American and African cotton, though through the whole of Ava no better quality is known, and though the bad Ava cotton is even exported by land, many hundreds of miles, on mules and ponies, into the Chinese province of Yunan. What a field is here open for a speculator to introduce a better quality! The Commissioner Mr. Blundell's great exertions in distributing Pernambuco plants throughout the provinces have unfortunately failed from the moisture being too great for them, and though the rain in Mergui is more uniformly distributed, yet the plants are equally unproductive. It seems to me that annual plants deserve a greater consideration.

Inferior quality of cotton.

Pernambuco cotton a failure.

In my first report I expressed my opinion that Manilla cotton ought to be tried on account of the congeniality of the climate, and I venture to add now that in the southern provinces during the dry season, Egyptian cotton in ground not too rich would do equally well. Since the introduction of English chintzes, it is said that the home manufacture of the chee pudsos (or woollen native cloths) has greatly diminished. Mergui is entirely provided with them from Rangoon.

Manilla and Egyptian cotton recommended.

Sugar-cane.

This, an important article, as already mentioned, is entirely neglected throughout the provinces, nothing but a little for home consumption being cultivated in gardens. There are three varieties in use, all three, though not of the best, yet pretty good. The cane thrives everywhere most luxuriantly, and has in the bazar a very low price. In travelling inland, it was a general custom with the villagers on entering their groves to give the coolies and animals sugar-canes in abundance. The new emigrants from Siam seem to pay greater attention to the sugar-cane than the original inhabitants, and on the smaller Tenasserim many acres of land are exclusively cultivated with the cane. The few samples of Otaheite sugar-cane, which have been presented to me by the Agri-Horticultural Society of Calcutta, thrive remarkably well.

Sugar cultivation equally neglected.

Siamese beginning to cultivate sugar.

It has been observed that the Chinese are the only people who understand well the sugar-cane cultivation, but until they become more numerous in these provinces, sugar will remain neglected, unless some Europeans should undertake the cultivation of it. Any one well acquainted with the manufacture would find here many facilities which might not be found elsewhere. In the Straits, sugar cultivation is very flourishing. In Province Wellesley 2,000 Chinese are exclusively occupied with the sugar plantations

Inducements to Europeans.

and derive abundant profits. The exuberance of productions in the rich new lands in the province, where the forests have been just cleared, would be one of the greatest allurements for its cultivation.

The same observations respecting tobacco, indigo, coffee, pine apples and plantains, started in my first report, will be found applicable to the southern provinces.

Respecting the betel vines, I have got the following information, with reference to Mergui Province, from Mr. Corbin.

Betel vines.

Statistical detail of betel vines cultivated in Mergui.

The largest plantations of this vine are at Cutwain and Beiktown (both villages equidistant from Mergui), but there are small ones in all parts of the town and in every village. The vine when young requires a great deal of care and attention, and must be planted in very rich soil, which is still made more so by the introduction of buffaloe manure and the husk of paddy in a rotten state. The young vine must be perfectly secured from the rays of the sun. The season for planting is in March, April and May; if it succeed well, the cultivator may commence gathering the leaves five or six months afterwards, and continue so doing for about 15 months, when the vine dies off or the leaves become so small as not to be worth the attention of the cultivator.

The leaves from each vine are gathered once a month, to the number of about 50. There are about 42,000 vines, each giving a monthly return of 50 leaves, or 2,100,000 leaves per month. The leaves are sold in bundles, each containing 50, four of which are sold for one anna. The average consumption for one person is 14 leaves per day.

The duty on the betel vine is levied annually, every 100 vines paying a tax of Rs. 2, but for the encouragement of cultivation, a planter, who may have an extensive garden, does not pay a duty on more than 600 vines, beyond which he may grow *ad lib.*, without subjecting himself to a heavier tax on this article than Rs. 12 per annum.

The amount of duty collected this year is Rs. 840.

Gambier.

Gambir occurring wild in the provinces.

The Nauclea gambier, catechu or terra japonica, is occurring in the southern provinces, chiefly along the banks of the Lower Tenasserim, at Tenasserim itself, and below it; whether it is indigenous or introduced at some period, when these parts were more populous, I do not know. It attains the height of six feet, and is to be observed not far from the river banks, and seems, though perfectly wild, to grow very well. The natives, the Careans at least, are acquainted with its properties, and chew the leaves with betel vine together.

The terra catechu of the bazar is not produced from the gambier. It is chiefly imported from Rangoon, and comes from Ava, and is the product of the acacia catechu, which, as in Hindoostan, is very common in Upper Ava. Only a few of these trees grow in the town of Mergui. Terra catechu a different production.

This astringent has been lately greatly recommended as a substitute for oak bark and sumach leaves in Europe.

Areca-nuts.

Areca-nuts form one of the few articles of production of some importance in the southern provinces. The areca in Hindoostan is undoubtedly a stranger, it thrives poorly in Moulmain itself, it is not yet at home, only the rich alluvial islands in the Salween produce the palm, but the quantity of fruit is not great. The latitude of Tavoy or the 14° seems to be the beginning of their home in the eastern hemisphere. In the valley of Towngbiaun you may see the first extensive areca plantations. The palms improve decidedly towards the south; and in Mergui you may see them already in full vigour. They produce there already as much as in the Straits, *i. e.*, a tree in good bearing yields at an average three to six bunches from 90 to 160 nuts each annually; the climate may be therefore pronounced congenial to their growth. There is not one hut which has not an areca garden or at least some trees, and even the Careans in the south plant them. The plants seem to require no particular ground. Rich mould on the sides of the hills and moist situations seems to me to be what they require. The great fault of the natives is that they crowd them too much and impede their growth. On the island of Madremecau, opposite the island of Mergui, some fine cultivations sprang up lately, not one however in the whole province of an extent sufficient to merit the exclusive denomination of an areca plantation. The following notice is from Mr. Corbin in Mergui:— Areca-nuts a most valuable article.

This year's produce of the areca-nut was in number 4,200,000, the number of trees bearing fruit 14,000, that of those not bearing (from one to six years' growth) 150,000. Each bearing tree pays a tax of eight pies or two-thirds of an anna per year, and the average produce of a tree is 300 nuts, which are gathered in the months of September and October, and sold in the bazar at the retail price of twelve for an anna. The tree generally produces in its seventh year; the first year it is planted, if the soil be suited to it, the plant will grow to the height of 3 feet, but the following years it does not shoot up at the same rate: a growth of 1½ to 2 feet is the most that is expected. The areca will give fruit about 25 to 30 years; when passed bearing, the tree is cut down and the wood principally used in the construction of native houses, for floors, rafters for the roof, &c. The fruit when gathered if left Notice about the areca plantation in Mergui Province.

in the husk will not keep good above two or three months, therefore it is husked and put in soak for about three days, then exposed to dry, when it becomes of a red colour and preserves in this state for upwards of a year; if it do not undergo this process, it becomes white and the natives do not approve of it, neither does it keep the same length of time. The price of the red is generally double that of the white. Taking the whole of the population, the consumption of this article may be computed to one nut per day for each person. It is not exported from this, as the quantity collected in the province is not near sufficient for the consumption; the supply is made up by importations from Penang and the Nicobar Islands during the months of February, March and April.

This season 2,905,000 were imported and sold at Rs. 18 per 10,000.

No duty is charged on goods either imported or exported.

Cocoa-nuts.

Cocoa-nuts neglected.

The cultivation of cocoa-nuts has been sadly neglected, though they thrive, especially near the sea-coast, admirably well.

There are not even sufficient trees to answer the limited demands of the natives, and several ship-loads of cocoa-nuts are annually imported from the Nicobars.

Prejudices of the natives.

The natives have a great reluctance to plant cocoa-nuts. They excuse themselves by saying that 12 years must elapse before they can see the fruits of their labour, but there is another reason. In the time of the Burmese all cocoa-nuts belonged to the chief of the town or village, and by whomsoever planted, they were considered the property of Government. As the Burmese to this day have not yet given up the idea that the English will either voluntarily give up the provinces to the Burmese or have a good chance to be expelled themselves, they consider the cultivation of cocoa-nuts a great risk, as in the case of a Burma rule they are sure to lose such property.

They merit however particular attention.

The cultivation of the cocoa-nut, where it can be effected, merits particular attention and encouragement, as it is an universally useful tree. It is not only an article of food to every one, even to the commonest labourer, but it is a valuable article of exportation. The natives say that cocoa-nuts on the Nicobars yield on account of their age annually less, that few new trees spring up, and that in fact they are managed by the natives themselves so badly, that in a short time the supply will not be sufficient. As these provinces draw altogether their supply from the Nicobars, in that case the price of cocoa-nuts must very soon rise, and extensive plantations *in loco* would therefore be highly advisable, much more so because of late years the cocoa-nut oil has formed an article of exportation

The supply from the Nicobars diminishing.

to England, where it found an excellent market, being found of great use in the manufacture of candles. Cocoa-nut oil for the English market.

Extensive plantations cannot be expected from the present landholders, on account of the great outlay of capital required before it begins to return the interest. The palms begin to bear in the eighth year, and are in the twelfth in full bearing in each tree, as above stated, yielding then from eighty to a hundred nuts annually. The cocoa-nuts have many enemies in other parts, which are here either unknown or insignificant. Amongst these is a species of calandra, which descends in the shoot of the young plant and kills it. Slow returns, an obstacle.

* The number of bearing trees in the province of Mergui are 2,540, each producing about 50 nuts per year, making a total of 12,700 nuts: these are consumed in their green state by the inhabitants. The number of young trees may be calculated at about 2,000; these commence to bear when nine or ten years old, and continue doing so till they are 50 or 60. The market price of the green nut is Rs. 3 per hundred; a duty of eight annas per year on each bearing tree is levied by Government. The trees growing within the town and at the village of Cutwain, situated about two and a half miles north-east of Mergui, are considered the most productive. Number of trees in Mergui Province.

Nuts for culinary and other purposes are generally imported from Penang and the Nicobars, at the same season as the areca. Imports in 1838, 16,000 cocoa-nuts at Rs. 3-8 per 100.

Nipah. (Nypa fruticans.)

This is a very useful palm which occurs only in great abundance in the southern parts of the provinces. In Moulmain only few straggling specimens are to be met with. In Ye district they begin to be more common, but it is only from the Palou river, they seem to be at home; in Mergui they are to be found in perfection. It is in fact an indigenous plant of the Indian Archipelago, which like many other vegetable productions of that peculiar part of the world, ascending as far as Mergui, without however reaching the latitude of Moulmain. This palm is a production of the brackish water growing exclusively in the mangrove territory. It is a palm without stem; the lower part of the branches is, at high water, inundated. The nipah grows partly wild, but is also cultivated, and the Mergui people consider it a very productive cultivation. The plant grows quick, so that it is in the fourth year full grown, and requires very little care, nothing but the annual cutting down of the surrounding salt-water jungle being requisite. As however all cultivation is carried on only on a very diminutive scale, it is evident that ample room remains for increased Nipah, one of the most useful palms. Its territory. Grows quick.

* From Mr. Corbin.

cultivation. The numerous creeks, the numerous arms of the Tenasserim, and the intervenient nullahs in these marshy localities, are the places where it could be propagated with advantage. The use of this palm is double.

Double use. Leaves.

1*st*. The leaves are the only thatch of all the roofs of the houses in the provinces, and as they last only three years on account of the attacks of lignipervous insects, chiefly of the genus Bostrichus and Rhinosimus, it may be imagined that the consumption is very great. The leaves are exported almost all from Mergui to the northern parts.

This year the nipah planters had a very good profit; the number of buildings required to shelter the two newly arrived regiments in Moulmain increased the demand beyond limits. The leaves possess the property that they are much less easily ignited than any other of the palm tribe; they are therefore preferred to all other species, chiefly to the cocoa-nut leaves, and much more so to the grass leaves. I do not know if a particular system is required in cutting the leaves. I observed that the people before the setting in of the monsoon deprived the palms almost entirely of them, leaving only a few not yet full grown.

It is ascertained that an acre will yield about 7,600 leaves, which sold this year in Mergui, before they had been converted into mats, from Rs. 10 to 12.

Palm wine and sugar.

The people make use chiefly of the leaves, but the most valuable product of this species is the toddy or palm wine which it yields, and which can be converted into syrup, and, as recent experiments have proved, with facility into sugar, which is superior to the Indian jaghery, only care must be taken to neutralize the saline particles with which the sugar is naturally impregnated, the whole plant apparently being imbued with soda water, on account of its growing in brackish water.

Method of making sugar.

The natives bind the boiled toddy in a piece of cloth, and after having tied it fast, hang it up in their houses with a vessel underneath. The syrup drops out and the crystalline sugar remains behind.

The produce of juice is very great, it is reckoned that 800 palms yield annually 350 cwt. of juice or 170 cwt. of syrup, which, if united to the profit arising from the leaves, would render the cultivation of the palm tree on a large scale a most profitable undertaking. A great extent of country, now entirely waste, could in this manner be made remunerating.

Other palms. Rattan

The other palms found in the country, are of no great practical use. The rattan palms, though sufficiently annoying to the traveller in the interior, are not so numerous as to be able to compete with the inter-equatorial regions in that article. There is one kind of rattan of surprising strength, greatly valued; it is used to tie up

elephants during the night. The Careans bring it occasionally to the seaports.

The Pandanus odoratissimus is a favorite cosmetic amongst the Burmese; the pollen is used by the women as an antisudorific. The flower possesses a very sweet scent, but the fragrance is so strong that few Europeans are able to bear it; in delicate ladies it is even able to produce convulsions and fainting fits. A piece is sold in the bazar of Mergui for one or two pice in the season, which is at the beginning of the monsoon. Pandanus odoratissimus. Use among the natives.

Durians. (Durio zibethinus.)

This is the most important fruit tree with the Burmese. It is so highly appreciated by all classes, that it is said that the King of Ava, after having been obliged to give up these provinces, lamented nothing so much than to have ceased to be the lord of the durian forests. This tree does not grow so far north as Moulmain, some few trees excepted, which are growing as a rarity on the island of Beloo. Its sphere begins at Tavoy—large plantations are to the east of Mount Burney, and very fine specimens in the valley of Towngbiaun. Lower down on the Tenasserim, the tree begins to be almost spontaneously growing, and in latitude 14° it forms large forests. It is there a high tall tree of — feet and more in elevation, the wood yielding, as I am told, excellent masts and spars, which are used sometimes by the Chinese. The fruit mostly appreciated by natives. Its territory. Description of the tree and fruit.

The taste of the fruit is different from any other, and on account of the strong smell repugnant to almost all Europeans in the beginning, with the exception of a few. There are however none of the older residents in the country who do not relish it in time; the taste is then an acquired one, but there is no native of the lowest condition who is not so extravagant in the durian season as to allow himself several durian feasts. The tree is dicœceous, and each tree occupies a great circumference, and as the tree grows almost wild, a cultivation of durians will not be found very advantageous, at least at Mergui, whilst the ground otherwise employed can be made to yield a greater interest. In Tavoy the case is different; the fruit has there more value, because it is two degrees nearer to Rangoon, the chief mart of durians. The number of boats loading from the coast of Tavoy for Rangoon must be considerable and the profits not small. The fruit is with difficulty preserved, not keeping above six to eight days, and it is for the Rangoon market wrapped in cloth dipped in clay. The price in Mergui is between Rs. 2 and 3 the hundred, when abundant in the market; in Rangoon the price is sometimes one rupee each. An article of exportation.

The King of Burmah sends annually one vessel to Tavoy for durians, which on arriving at Rangoon are transported by relay horsemen or by war-boats manned with 40 or more men up to

Ava. The surplus fruit is salted and pickled, and forms as much an article of exportation, chiefly from the valley of Towngbiaun.

Use of the husk.

The Chinese employ the thick husk of the fruit for the purpose of bleaching silk, which purpose it answers admirably well. It forms a saponaceous matter, which has equally the property to destroy and remove the glutinous integument of the silk fibre.

The flowers contain much saccharine matter in their nectaries. The honey of the durian forests is considered the most aromatic. The flower and incipient fruit have for this reason to contend with many enemies, chiefly birds of the family of the honey-suckers and the small green parroquet (prehensilis) which is considered their chief destroyer. Flocks of many thousands swarm in the durian gardens in the time of the blossom, which is at the end of February.

Mangosteen (Garcinia mangostana)

Mangosteens not indigenous.

Is an equatorial tree, introduced from the Indian Archipelago, which finds its northernmost limits in Mergui. The fruit of this tree is certainly the most delightful in the east; it is very much to be regretted that it scarcely allows any exportation. As long as the number of trees remains limited, the profits arising from the cultivation are great. A full grown tree yields 1,000 fruits, which at the lowest can be reckoned at Rs. 3 per hundred.

The integument of the fruit yields a very strong and valuable tan, which has hitherto been entirely neglected.

Jack (Artocarpus integrifolius)

Has been in my first report already mentioned as growing luxuriantly in Amherst Province, but it thrives in the highest perfection in the southern parts.

Jack tree, one of the most useful productions in the East.

It is certainly one of the most valuable trees, the properties of which however are not sufficiently appreciated. There is not one part of the tree which is useless. The fruit is a common food for the people, the wood yields an abundant yellow dye (the sawdust is generally boiled for this purpose), the wood is excellent for furniture, and is thought sometimes equal to mahogany, the leaves are wholesome food for cattle, and a species of indigenous silk-worm feeds upon them, the bark exudes a species of caoutchouc, but what seems to be the most valuable part, and which has been hitherto entirely neglected and is in the provinces unknown, is the great quantity of oil which can be extracted from its kernels.

Spices.

Province of Mergui adapted for spice cultivation.

Spices will perhaps never thrive in Moulmain, but in Mergui the case is different. The difference of climate in both places is in no way so conspicuous as in reference to species. It proved that they grow freely in Mergui; the specimen of nutmegs, which are

at present to be seen on the island of Madramecan, opposite the island of Mergui, are flourishing like those in Pulo Penang.

The spice cultivation has manifested itself since the recent experiments in Penang to be the most productive of all eastern intertropical plantations. The monopoly which the Dutch have so severely exercised in their possessions has partly ceased; the West Indies, Brazil, the western coast of Africa and Isle of France, have come in for a share of the precious productions, and in later times, Penang and Province Wellesley have become conspicuous for their plantations. Great inducements to engage in the cultivation of spices.

Government have liberally given the first impulse for the introduction of spices in those newly-acquired parts, and though afterwards prematurely abandoned, yet the example and stimulus given has crowned of late years the endeavours of some planters with the most eminent success, notwithstanding the discrediting and discouraging belief of the multitude, and it may be said that a Government nursery at Penang, then considered a matter of minor importance, has been the first step towards forming the islands an agricultural colony, without which the possession must have gone to ruin, since the first reason of its occupation to form it an emporium of commerce in the Straits proved abortive by the overwhelming rivalship of Singapore.

Mergui is only seven degrees in latitude, with very little difference in longitude, distant from Penang, and its climate approaches much more to that of the equatorial regions, than to that of the tropics, nearer to the line of Cancer.

The violence of the monsoon is already broken, its durations shorter, and rain falls in almost every month of the year.

No practical advantage has hitherto been derived from the few spice trees (about 450 in number); the Burmese themselves are entirely ignorant of the profits which they yield, and they certainly will not stand forward with experiments which can be only expected from Government.

SPONTANEOUSLY-GROWING VEGETABLE PRODUCTIONS.

I shall be obliged to be shorter than I could wish to be upon this head, for although having an opportunity of collecting a mass of materials, I have not yet had time and leisure to examine them. I refrain therefore from an enumeration of vegetable productions with varying Burmese names, before I am able to ascertain their botanical names, and before I have convinced myself that the virtues ascribed to them by a merely empiric nation are founded upon truth and unbiassed experience.

The natives know little about medicine. Their knowledge is more founded upon superstition than experience. In the application of herbs for medical purposes, they pursue no system; each practitioner has his own arcana, every old woman is *so ipso* a great Medical plants.

doctor, every person having his own views: many plants have no medicinal property without the assistance or permission of the nats and spirits of the forest in which they grow: the most efficacious remedies are in their opinion talismans.

Pharmacologia Burmanica.

From a people guided by such actions, no information can be gathered respecting the virtues and medical properties of plants growing in the country.

Their materia medica phytologica may be composed as follows:

1*st*, Plants possessing always medicinal properties.
2*nd*, „ „ conditionally medicinal properties.
3*rd*, „ „ no medicinal properties.

Subdivision of 1*st*.

1*st*.—Plants destroying human life in small doses (strongest poisons).
2*nd*.—Plants acting as violent remedies, producing violent effects in the human constitution.
3*rd*.—Plants operating in a lenient way.

Under plants conditionally efficacious, such must be understood as wanting in their opinion the effect of a superior spirit to prove powerful.

It may be easily understood that the natural virtue of these plants is obsolete or none whatever. As all which is preternatural with man in his infancy has a stronger hold than that which lies the nearest to him, these remedies transformed into charms are in case of sickness the first resorted to.

Burmese practitioners.

If imagination, faith, and accident does not help, plants operating in a lenient way are selected, but generally the sickness is so much advanced that they prove without effect, even if empirically known as efficacious; and when the patient is on the brink of the grave, the Burmah physician resorts to violent operative drugs: amongst these belong the emetica, the strongly drastica, emmenagoga and narcotica, so copious in this country, so full of vegetable poisons, too often too efficacious in the hands of a Burmah practitioner not to prove too often fatal. I know a case where a Burman, considered a very clever man, prepared before my eyes an emulsion from fresh nux vomica, about two drachms (propotu instanter sumendum)* to a man who laboured under delirium tremens in consequence of opium smoking. The potion was administered to the poor man, and he expired twelve minutes afterwards.

The Burmese do not know how to account for the virtues of medicines; as much as I understand, they are in their theory a sort of humoral pathologicians—every sickness comes from the blood, every medicine acts upon the blood. The blood is either green, yellow or blue, or it is stony, mouldy, acrimonious, too old

* This quantity I ascertained afterwards.

or too young. I have collected a great number of medicines in different parts of the provinces, which I hope to be able to submit to farther examination.

COLOURING MATTERS

are numerous, very few hitherto examined, very few applied, besides those which are known in other parts of India.

YELLOW DYES.

Species of Curcuma.

1st. Curcuma—several species, besides longa and rotunda, very common, growing wild in the jungles in low marshy grounds or shadowy places. Much used, partly as indispensable for certain cures, partly to dye clothes, chiefly the Poonghy wearing apparel.

New dye.

2nd. In the interior, towards the east, in the parallel of Tavoy, I found in the bamboo forests another plant nearly allied to curcuma, which yields a very good pigment. It is about four ——— above the ground, scarlet red, tastes burning similar to ginger bitter, colours the saliva orange yellow.

Chymical examination.

Upon examination it yielded a pigment resembling curcumine, containing besides a good proportion of ethereal oil, indissoluble in boiling water, easily dissolved in alcohol and ether; concentrated solutions possessed a dark brown, diluted an orange colour; oxydes of metals produced a precipitate.

Precipitates.

With solution of tin	. . . .	red or orange.
,, ,,	lead	chestnut brown.
,, ,,	iron	brown tinge.

Boiling it with alum and water, and pouring the solution filtrated upon powder of chalk, partly decomposed the alum and precipitated the pigment mixed with alum earth, partly mixed itself with the alum. This plant (of which I hope to be able to give soon a more detailed account, with its systematic name) is to be found in great quantities in the dry season, and its pigment, seemingly superior to curcuma, could be rendered an article of exportation.

Jack.

The yellow dye of the jack.

The sawdust of the jack tree, boiled with alum as a mordant, is used either as a yellow for Poonghies' clothes and to dye woollen pudsos, partly used for green, united with jungle indigo. The colour is not durable and in every respect inferior.

Annotto, or Bixa orellana,

The annotto widely spread in the provinces.

though originally an American plant, and though as much as I am aware not much used by the natives, is notwithstanding widely spread over the provinces. It thrives luxuriantly in almost every ground. It has almost no value. In Mergui, considerable

quantities could be got at a very cheap price throughout the year, as the plant is in constant bearing. The plant forming, chiefly in the French West India settlements, an important article of exportation, merits some attention.

There are seven other vegetable productions besides, known to me to yield yellow dyes, which however are not yet examined.

RED DYES.

Sapan wood,

Trade with sapan wood.

one of the most important articles of the Mergui Provinces; in fact, what teak is to Moulmain that is sapan wood to Mergui, only on a small scale.

There is only a very small part of the Tenasserim Provinces which has sapan wood. It seems to be a stranger to the western side of the peninsula, though it is common on the eastern or Siamese side, and that part within the British boundaries which has sapan wood is on its easternmost confines up the river Tenasserim, distant in boats at high water, during the monsoon, twenty-two to thirty days. The limited space which is overgrown with it, the number of years during which it has annually been cut, and the total absence of superintendence in cutting it, are strong reasons to fear that it will be in a short time extirpated within the British boundaries.

This valuable production, though spontaneously growing upon such a limited space, is growing freely in different localities when planted. Even the indolent Burmese, probably induced by the high rate of profit which they have from it, have been roused into a state of activity, prompted perhaps by mere curiosity and have transplanted it to Tenasserim and the island of Mergui. I saw specimens of both places, and they were perfectly sound and rapidly advancing. A plantation near Mergui, to save the long transport, would in time be perhaps even more valuable than the spice gardens of Penang, the hundredweight of wood being last year paid in Mergui at six rupees. The natives go before the monsoon up to sapan forests in boats; on account of a failure in the speculation last year, the number of cutters this year is smaller.

They cut the wood of sizes, indiscriminately of course, in the best situated localities; and since it became scarcer, dig equally the roots out and destroy the trees, which ought to be strongly prohibited. In the month of August they begin to float it down on rafts, during which process much of the colouring matter is lost; such is the negligence, that they leave it in Mergui for weeks in the river, notwithstanding the constant loss of pigments.

The trade is entirely in the hands of the Chinese, some of whom made in Mergui a fortune by it, and it is chiefly in Chinese junks transported from thence to Calcutta.

There are two other specimens of the same genus, besides the Cisalpine sapan, whose wood yields dyes; their qualities however are not yet ascertained. One is a common prickly bush on the river banks in the southern part of the Tenasserim, called the rhinoceros bush.

Extent of the trade in Mergui Province.

*The season for cutting sapan wood is after the commencement of the rainy monsoon, on account of there being water in the nullahs for the men to proceed up to the forests with their boats, having to take with them provisions, &c., for upwards of two months; after returning with their wood, many of the men engage to perform a second trip.

Statistical notes of the sapan wood trade.

In 1837 the number of boats employed the first trip, quitting Mergui for the forests in June and returning in August, was 36, with a complement of 720 men. The quantity of sapan wood cut and brought down to Mergui by these people was 363,550 viss, which was contracted for with the Chinese and other Mergui merchants at the rate of Rs. 6-6 per hundred viss.

The second trip, quitting Mergui the latter end of August and beginning of September, returning in November, twelve boats with 240 men were employed, and brought down 99,200 viss, contracted for at Rs. 6-12 per hundred viss,—

Showing a total of

	Boats.	Men.	Viss of wood.		Value.		Duty.
					Rs.		Rs.
1st trip ...	36	720	363,550	At Rs. 6-6 per 100 viss.	23,176	Duty 15 per cent.	3,476
2nd „ ...	12	240	99,200	„ 6-12 „ „	6,696	„ „ „	1,005
TOTAL ...	48	960	462,750	...	29,872	...	4,481

The sapan wood is floated down from the forest on small bamboo rafts, each carrying on an average 1,200 viss; these are conducted by two and often three of the cutters. Immediately on their arrival off the Bankshall, they are discharged and the wood weighed under the superintendence of the Register of Imports and Exports, when the duty of 15 per cent. is levied, but a discount of 5 per cent. is given in favour of the proprietor on account of the mud and moisture which the wood may contain. The duty was formerly paid in kind or money, but of late years the Government have received it in cash.

July 18th, 1838, twenty-eight boats with 594 men have now gone up to cut wood, the contract price Rs. 6-6 per hundred viss.

* Memorandum from Mr. Corbin.

Sandal wood

occurs in the southern parts of the provinces, two species I suppose, both different from the Pterocarpus santalinus of Ceylon. It is said to occur in great abundance on the islands to the south of Mergui, and the Chinese cut it there clandestinely for the Chinese market.

Nee bay atzee.

Nee bay atzee growing wild.

This is one of the favourite dyes of the natives and a durable colour. I do not know if the plant is known in India. It is a 55 to 20 feet high tree, belonging to the family of the Annonaceæ. In Moulmain it is cultivated, but a little to the southward it grows spontaneously and is pretty common in the tracts of country between Ye and Tavoy. The wood is used and gives a fine light red colouring when mixed with chunam. It has, as much as I know, never been exported.

Dragon blood.

Different species of dragon blood.

Under this denomination many substances are understood, and, owing to the promiscuous misapplication, many misunderstandings take place. The Oratava, dragon blood, or Dracæna draco, is quite different from the Pterocarpus santalinus (which is the sandal wood) and this again from the Calamus rotang of the Straits. The dragon blood of these provinces is neither such a production as that from Canary Islands, nor the noble tree which I have already mentioned, nor a palm, like the dragon blood from Penang, but a mighty creeper, which exudates a great quantity of that resinous substance. When cut at first, it has a great resemblance to human blood staining the ground, afterwards it coagulates. Experiments have proved that it has exactly the same qualities as the Penang; it can be equally well used for alcoholic and oil of turpentine, varnishes, for the colouring of marble, &c.

———— tinctoria.

A new sort of madder.

This is a mighty creeper of the jungle belonging to the family of Rubiaceæ, a kind of madder, and apparently a very valuable article in future, for it yields a permanent colour. I do not know if it is known; the natives are unacquainted with its use. The root is the valuable part yielding the dye. Besides being valuable on account of yielding a permanent colour in general, it seems, like the Oriental madder, to be chiefly well adapted for cotton colouring. It is not yet ascertained if it contains, like madder, two distinct pigments, the alizarin and purpurin.

Orseille, Rocella tinctoria.

Orseille not yet found.

I had no opportunity to satisfy the wishes of the Asiatic Society of Bengal communicated to me respecting this very valu-

able dye, now so much in request in England. My researches this year have been all inland, without having visited one of the thousands of islands constituting the Mergui Archipelago.

Besides that the inland lichens, like the Variolaria orcina, dealbata and others, collected from the rocks of Auvergne and the Pyrenees, never yield a valuable porsio; there are not even such to be found in this country, where all rocks are covered with one mass of verdure. But I expect with certainty, if circumstances allow me to visit the Mergui Archipelago, to find rocella on some of the islands equal in quantity to Canarean lichen, chiefly on those which form a part of the great volcanic belt extending towards the Andamans, which volcanic islands are much less overwhelmed with vegetation, and whose basaltic rocks leave ample room for its development.

Stick Lac.

Stick lac equally neglected in the south.

Of this valuable production I have already spoken in my first report, and have only to add that it equally occurs in the interior, but is totally neglected. The Careans know of it, but the tribes of this race living in the southern parts of the provinces, are, with great difficulty, to be persuaded to come and bring it to the market.

Palma Christi.

Ricinus a constituent of a dye.

Ricinus has hitherto been known as an oil, but not as a constituent of a fine red colour. I owe this discovery to the communication of a jungle Carean from the neighbourhood of Metamio. He procured the seed and took the pennatifid leaves of a small tree, lugheaur called by the Burmese, which have a sour taste, and added them to the compound, continuing to beat it for ten minutes in a wooden trough, after which a red dye separated, which had a fine dark carmine colour. It is said to be permanent, and the Careans use it for their garments. The tree is common on bad dry grounds, a favourite food of goat and deer; the few Europeans who know of its existence and properties use the young leaves for making salad. It has the greatest affinity in taste with rumex aictosella.

Palma Christi can of course be everywhere produced, the materials are therefore in abundance if the dye should prove valuable.

Other dyes.

There are besides six or seven species of trees known to me, of which either the bark or the sawdust of the wood yields a red colour, but they have not yet been examined.

BLUE DYES.

Indigo.

Indigo and substitutes.

As in Province Amherst, indigo cultivation is entirely neglected. In the interior some other substitute, chiefly a vine resembling a vinca, are used by the Careans. This is the proper way of the Burmese. In the valley of Towngbiauk, the Indigofera tinctoria is prepared in the Chinese or Siamese way,—that is, liquid. The

Burmese spoil their indigo when endeavouring to transform it in a semi-crystalline mass by adding a disproportionate quantity of lime for its basis.

BLACK VARNISH.

Black varnish trees grow spontaneously in the latitude of Tavoy.

The black varnish, tzee tzee of the Burmese, mentioned in my first report as an important vegetable production, is in the latitude of Tavoy at home.

On Mount Burney the forest trees are composed partly of this tree, which in the month of February, when in blossom, resemble most the pear or plum trees in flower. It is chiefly gathered on the Siamese confines, in the high ranges of mountains, where the two varieties are found. The greatest part is however gathered in the Siamese territories.

The Burmese do not like the occupation of extracting the varnish, on account of its vesicant properties. When gathered without caution it excites œdematic swellings over the body.

The tree can easily be transplanted or reared from seed, and will undoubtedly become in time an article of cultivation.

Properties of the varnish.

The varnish has the peculiarity that it does not dry in dry weather, but exsiccates quickly during the monsoon. The Burmese use it for the construction of their peculiar bamboo boxes to make them water-tight; it could be besides recommended as an everlasting coating for iron steam engines and cannons.

WOOD OIL.

Wood oil wasted for the manufacture of torches.

The dammer torches of the provinces are formed from wood oil, sawdust and palm leaves, and are superior to our European pitch torches. They fetch an exceedingly low price, and between Tavoy and Ye, in the midst of the jungles, there are poor people occupied with their manufacture. This occupation is considered exceedingly unhealthy, giving origin to phthisis, pneumonia, and similar diseases; the poorest people are therefore only occupied with it.

Chymical properties of the (vulgo) wood oil.

It is a great pity that the commonly called wood oil, which is not oil but a varnish, is wasted in this way, yielding when distilled a superior product; it is then more transparent than copal or mastic, is without smell and taste, shining, brittle, melts easily, burns with a perfume similar to frankincense, specific gravity 1·097 to 1·123; it dissolves entirely in ether, turpentine and substantial oils, and consists seemingly (being only partly dissolved by alcohol) of two different substances. Kali ley does not dissolve it but yields a resinaceous soap.

It may be supposed that it is equal in quality to copal, and merits as an article of commerce particular recommendation.

FRANKINCENSE.

A new kind of frankincense.

One of the first timber trees in the provinces, by the Burmese considered superior to the teak, chiefly for buildings under water,

is the thingan or the Hopea odorata. Besides its capital wood, it exudates a kind of frankincense, which appears on the wounded bark in small whitish pieces, is brittle, when perfectly dry covered with a white powder, when broken semi-transparent, with a pungent aromatic taste when fresh, upon burning charcoal yielding a very agreeable perfume; it could be used as a substitute for olibanum.

OILS.

Enumeration of oil-yielding plants.

The number of oil-yielding plants is very considerable in the provinces, many of which are not yet examined. The commonest oil is sesamum, which is used by all classes of natives for cooking purposes. It grows very well, but is only cultivated for home use. Cocoa-nut oil is chiefly used by Europeans in limited quantities.

There is a tree approaching the genus Nerium, growing in brackish water, just above the sphere of the mangroves, which produces a great quantity of large nuts, from which the Chinese in Mergui extract a fine colourless oil, which is exported to China for purposes unknown. It resembles the palma christi oil in its medical properties, but is much more drastic than ricinus. The ricinus itself is not introduced in the southern provinces, except round the houses here and there scattered. The jack fruit and the durian yield oil in a great proportion.

Cayeput oil trees discovered in Tenasserim.

On the island of Mergui occur the first cayeput oil trees (Melaleuca Leucadendron.) The occurrence of this tree, in this latitude, is a strong proof of the approximation of the productions of Mergui Province to the inter-equatorial eastern regions—this tree having been considered strictly belonging only to the Indian Archipelago. It thrives very well; the largest tree which I saw measured 12 inches in diameter.

WOOD.

Bamboo.

Bamboo a constituent of the riches of the provinces.

Bamboo belongs to the riches of the provinces; many thousand acres are covered with it. All bamboo grows spontaneously; the Burmese, so liberally provided with this necessary article by bountiful nature, of course do not want to trouble themselves with its cultivation, except for fencing in some few parts their gardens with the prickly variety. All stockades being abandoned throughout the provinces, its use for fortifications so common in several parts of Hindoostan has entirely ceased.

Number of varieties.

The varieties enumerated by the Burmese are very numerous, and most of the natives have a profound knowledge of their properties, the strength of the wood, pliability, durability, which is no wonder, as almost all their implements, instruments and houses are fabricated from bamboo. It is certain that the bamboo found in the country includes several (I suppose eight) botanically different

species; it is however difficult to determine the botanical characters, as the bamboo comes in flower only from 15 to 20 years once, after which the plant decays, whole forests die at once away until the second year; after this a new offspring occupies the desolate-looking places. The best bamboo (sometimes 8 inches in diameter) occurs in the interior on the slopes (generally the east side) of the elevated ridges—the best is found in the latitude between Ye and Tavoy; in Mergui Province the bamboo is comparatively inferior; great part of it however is superior to the bamboo of the opposite Indian peninsula.

Best localities.

Exportation not to be expected.

At the present time an exportation of bamboo can hardly be expected, except in the case that ships may arrive to take in cargoes of coal, and not finding another more valuable article, would fill up the remainder of their space with bamboo from the rafts upon which coal has been floated down the river.

Teak Forests.

Extent of the teak territory.

The teak forests of the Tenasserim Provinces do not go lower than the 16° of latitude, or they are only to be found in the country through which the Attaran river and its tributaries run. Beyond the range of mountains which divides the Ye river territory from that of the Attaran, not one single teak tree is to be found, much less so in the provinces of Tavoy and Mergui. In Province Amherst, which is consequently the only one producing teak timber, three separate districts must be distinguished; 1*st*, the teak district on the Thounggun river—2*nd*, the district of the Salween river—and 3*rd*, the teak district on the Attaran river. Of the teak forests belonging to the two first divisions, I have already treated in my first report; it remains therefore only necessary to speak of the last. The teak forests existing on the Attaran are the most extensive within the British boundaries, and the timber which they produce is considered superior to that which is cut on the Salween and Thounggun rivers. The same system which is used in the two first districts is equally followed in the last. The forests are let out by Government to private individuals, and a tax of one rupee levied upon each tree brought to Moulmain. This unrestrained liberty accorded to any individual to appropriate to himself any unoccupied forest under such liberal conditions, contributed without doubt in the first instance very much to render Moulmain a prosperous place; but it cannot be denied that a continuation of the same system will lead in a short time to the extermination of all available teak forests, and deprive Moulmain of this valuable resource, and render Calcutta once more dependent upon foreign importation for teak timber. It cannot be expected that individuals whose only care it is to render themselves independent in as short a time as possible, should care about the preservation of the forest,

Teak forest on the Attaran.

Defective regulations.

and experience has taught that by far more trees are destroyed than used. A particular survey of the teak forest, well drawn lines of demarcation, an improved system of regulations, the appointment of a respectable European to enforce the observance of these regulations, and new plantations laid out in all the places where teak formerly grew, and where it is now almost extirpated, are measures necessary to be introduced to secure an uninterrupted supply of teak timber for the future. Mr. Blundell, the Commissioner of the Provinces, having particularly addressed the Government upon the subject of adopting these or similar measures, I refrain from entering into further particulars.

Necessity of a new system.

Timber in general.

The Tenasserim Provinces are an almost uninterrupted immense forest from the water's edge to the most elevated mountain ridge, 6,000 feet in height; all ground left to nature is, without discrimination, without exception, covered with timber. There are no marshes, no sandy plains, no bare rocks, no such thing as an American savannah, nothing resembling a New Holland pasturage, only the pygmean endeavours of man rescuing the soil for his own purposes with the assistance of fire, have diverted a small fraction of the area from the primitive forest.

The Tenasserim Provinces one uninterrupted forest.

The area being 30,000 square miles, it may be assumed that one-fifteenth part of it is cultivated, leaving one other fifteenth for rivers and two other fifteenths for country which has been burnt down, and where only local vegetation has taken possession of the ground, there remains yet 22,000 square miles occupied by forests. Supposing that trees (measuring at least seven inches in diameter) stand 30 feet apart from each other on an average in a forest, then each tree occupies 900 square feet or 100 square yards.

Calculation—the number of trees.

4,840 yards=one acre.
600 acres=one mile.
100)2,904,000 yards in one mile.

29,040 trees in one square mile, multiplied by 22,000 miles, there are 638,880,000 timber trees in the provinces.

Each tree counted on an average at two annas intrinsic value on the spot, there is at present a dead capital of 7,98,60,000 rupees in the timber alone, which wants to be called forth into activity to ove useful.

Their value—great capital lying dormant.

Though one-half of it is so situated that centuries will elapse before it will be turned to any use, yet the other half is so placed that it is available. The whole of the country on an average not more than 50 miles broad has a sea-coast accessible in all parts of 6° or 414 miles in length; the land is intersected in all directions by numerous rivers, the tide ascends in some parts 120 miles up the country, the timber of the islands is close to the edge

of the sea; and with all these facilities the timber is hitherto entirely neglected. I have now already gathered a catalogne of 377 different species of trees, each of which attains at least a diameter of 7 inches, and amongst these are species fit for every imaginable purpose.

Division of all the timber trees.

The trees in general can be divided into—

1*st.*—Precious trees—that is, such where the wood is sold according to weight, such as sandal wood, camphor wood, the fine, grained ebony, the iron wood used by the Chinese instead of nails, the sapan wood, and other woods yielding dyes.

2*nd.*—Woods fit for objects of ornament—such as thec hessman tree excellent for turnery, fit for furniture such as the mahogany of the provinces.

3*rd.*—Timber for ship-building—besides the teak, such as the anam, the anjin, the kananthi, the pynmah, and twenty others, some of which are by the natives preferred to teak, such as the thingan (hopea ordorata) for that part of the vessel which remains under water.

4*th.*—Such as are fit for military store-house, building and utensils—of which there is a great variety. The number of heavy woods not floating in the water is comparatively very great.

5*th.*—Such as yield spars for vessels.

6*th.*—Such as are peculiarly fitted for planks.

7*th.*—Such as yield good charcoal.

8*th.*—Firewood.

Peculiarities in growth and strength of the forest trees.

The greatest number of trees have the peculiarity to rise straight up, to elevate their branches above the lower vegetation of the forest, many having a bare trunk of from 40 to 100 feet in height, without one single branch, and these form generally a small crown compared with the size of the tree. Another peculiarity of these majestic productions is, that the circumference of the tree is not in the same proportion to the height as we are accustomed to see in Europe,—that is, the height is in perfection far greater than the circumference, which is to be considered as an advantage, as in most cases the length of the tree is of greater value than the thickness.

The firmness and elasticity of the greatest part of the woods is another characteristic, and this again is the natural consequence of their great height. If nature had not given them this property, they could not stand the impetuosity of the storm, but would have been broken down in numbers. This is however very seldom to be seen, and in no way proportionate to the damages which forests, chiefly of fir and pine, suffer in Europe.

A collection of specimens of timber trees, in number 185, gathered in the province of Mergui alone, will be soon delivered in Calcutta.

VIII.

ANIMAL PRODUCTIONS.

ELEPHANTS.

Elephants very numerous.

THE number of these animals is here greater than in any other part of India, Ceylon not excepted. They enjoy the uninterrupted possession of the uninhabited wilds to the eastward, and have an ample sphere for their migratory habits, from the Chinese seas, through Cochin-China, Tô. quin, and Siam, to the Tenasserim Provinces. The absence of population and the superabundance of to them congenial vegetable productions, attracts and maintains these great numbers.

Habits of the Asiatic elephants.

The Asiatic elephant shuns the neighbourhood of man more than any other animal. The depredations upon plantations which the elephants perpetrate in Africa are here unknown. The nature of the African elephant must be different, for sugar-cane and plantain trees are equally delicious morsels to the Asiatic species. In these provinces it is known that the elephants instantly retire when some village, or it may be even only the frail hut of the jungle Carean, is built in the forest. In the plains of Amherst Province the elephants are scarcer, but become more numerous towards the eastern bonndary and near to the high mountain ranges. To the south of Moulmain on the Upper Attaran, they are met frequently during the monsoon. Herds of 30 and 40 pass through the mountain ranges near the Three Pagodas. To the eastward of Ye, chiefly towards the Zhay town, they are met in numbers. Near Tavoy they are almost never seen, in consequence of the comparatively dense population. Near Palou they are temporary guests during the monsoon. They are rare on the Upper Tenasserim, and scarcely ever seen near Mergui, but they are in the greatest number to the south of Mergui and east of Tenasserim. Visiting that unknown tract of country, where recently the coal-fields have been discovered, along the banks of the Little Tenasserim, they were so common, that on the banks of that river, scarcely a place of a hundred yards length would be found which did not present the impressions of their recent passage.

Food of the elephants.

The food of the elephants is different and diversified from the tender grass to some hard species of wood in the forests, but their chief food are the leaves of the bamboo, several species of ligneous creepers. They relish chiefly all plants which contain the milky juice from which caoutchouc is formed, and all trees either belonging or nearly allied to the genus ficus, hence their predilection for the branches of the pipul tree.

Haunts of the elephant.

The elephants like the rhinoceros, buffaloe and hog, are fond of water and mud, the monsoon therefore is their favourite time; then they descend into the plains and approach closer than ever human habitations; after the monsoon they gradually retire into that great mountainous tract denominated the central territory by the Burmese, where they wander undisturbed, for the elephants walk the greatest part of their life, and it is pretended, that a healthy elephant never lies down, except to cool himself in water, and that he, properly speaking, never sleeps.

Burmese do not use elephants much.

The Burmese do not turn to any account this useful animal; in fact the occupations of elephant trainers, drivers, catchers, shooters and tamers, are entirely in the hands of the Siamese, who are considered very skilful with them. Though wild elephants abound in the Tenasserim Provinces, the number of tame ones is very limited, and now only used by the tenants of the teak forests for dragging wood, and these elephants are almost all imported to Moulmain from the Shan States to the north of the British possessions. In the southern parts of the provinces tamed elephants are unknown or a great curiosity.

Price.

The price of a first-rate grown-up male elephant in Moulmain is Rs. 350 to Rs. 380. The price was formerly lower, but the increase of the timber trade increased the value of the elephants.

Trade with ivory.

The trade with ivory is equally in the hands of the Shans or Siamese, and chiefly in the hands of those who are foreigners. They come even so far as from Zimmay to Tavoy, wandering for months in the wilds, shooting elephants, but few sell their ivory in the Tenasserim Provinces, but return with it to their country, because they know to be themselves intruders who despoil the provinces of a part of the riches and revenue. Some attention should be paid to the subject, more, now, when the throng of Siamese emigration in the southern parts of the provinces increases annually, and they themselves begin to turn their attention to the trade with ivory. They themselves have already claimed redress against the intruders, who, not content with shooting elephants only, depredate also their little plantations.

Manners of the elephant hunters.

These elephant hunters are a very hardy race, able to support every change of climate and country. They live for months entirely upon the fruits of the jungle and upon dried meat of the elephant and wild boar; their arms are common English muskets; they fabricate their own powder, and shoot with bullets made of lead and tin, sometimes mixed with copper.

These people know the country the best, and are perfectly well acquainted with every pass leading into Siam. They bury in certain marked places the ivory; returning into Siam, they dig it out and carry it to the next river on the eastern side of the peninsula, and complete the rest of their lonely pilgrimage by water.

The chief mart for the fruits of their expeditions is Bankouk.

Besides the tusks they never fail to cut off the tail of the elephant, which is considered by the natives of higher rank a becoming ornament. All the rest of the huge carcase (excepting sometimes the claws) is left unused to decay.

The Tenasserim elephants considered inferior, and reasons.

The elephants of this country are noble and large animals; they are, however, considered much inferior in strength to the Indian. The reason of this inferiority is not to be attributed to the race, but to the manner in which they are kept and fed. Every elephant is supposed sufficiently able to gather his own food in the jungle and is scarcely ever fed with rice cakes. As the elephants in the teak forests work sometimes hard the whole day, and are expected to feed during the night in the jungle, they have indeed very little time for rest, and cannot be expected to endure the fatigues any length of time.

The Indian army could be supplied with elephants from this coast. Propositions to establish an elephant stud.

Government could easily supply from here at a moderate cost all elephants requisite for the military service in India. It would be perhaps recommendable not only to catch and to tame elephants, but also to institute an elephant stud. It is not yet sufficiently ascertained that elephants do not breed in a nominal captivity. It has not yet been properly tried. I consent that elephants will not propagate their species in a narrow space or stable, but if kept in an enclosed extensive jungle forest during the time of their excitement, it would perhaps be otherwise, at least the experiment would be worth trying. In any other part of India, excepting Ceylon, it would be difficult or impracticable: the vegetation and the quantity of congenial food to them is everywhere scarcer than here, besides the extent of country at the disposal of Government is here greater than anywhere, a large tract of convenient country could easily be selected, and as easily roughly enclosed, wood being no matter of consideration. For the present it would of course be cheaper to catch and to tame the wild animals, and it is only a proposition to provide for the future, for the more the advance of civilization claims the soil as its own, the more must its primitive inhabitants retire, and just the elephant claims the widest range for his exploits and for his unparalleled peregrinations.

RHINOCEROS.

Three species of rhinoceros.

Of this genus the single and double-horned species occur in the provinces, and it is still doubtful if there is not yet the third known to naturalists under the name of Rhinoceros Asiaticus Sumatrensis, likewise as it is not yet ascertained, if the tapir of Sumatra is to be found in the southern parts or not.

The single-horned species is in many parts very common,; the double-horned perhaps not more scarce, but more wild, hidden in the recesses of the forests, and shot only sometimes by surprise.

Careans the proper rhinoceros hunters.

It is very seldom that these animals approach villages, but they are met close to the solitary abodes of the sylvan Careans. With these it is a passion to hunt rhinoceros, in which they are very skilful, knowing as they say the best places to hit the animal, pretending that no Burman knows the secret to run a ball through the body of the rhinoceros.

The fact is that the Burmese in general are bad shots and cowards, and many do not dare to approach the rhinoceros, fearing its furious attack when wounded. The Shans, undoubtedly the best and hardiest huntsman, feel only a passion for the elephant—so all rhinoceros fall to the share of the Careans.

Rhinoceros fond of mineral waters.

It is an interesting observation that the rhinoceros like to drink mineral waters. The warm hydro-sulphurous springs are very common in the provinces, and when found in the recesses of the forest, I observed always the marks of rhinoceros in the surrounding mud. The Careans profit of this circumstance, building small huts in the trees above the water, expecting the arrival of the animals, to shoot them from there in safety.

Number of rhinoceros killed annually.

The number annually killed, but only guessing roughly, is about

from 60—100 of the one-horned,
„ 20— 40 „ „ doubled-horned species,

but these are only males. The rhinoceros when got at is generally in a wild gloomy den, and the huntsman is very often unable to distinguish the sex. Finding the shot animal to be a female, after cutting a small slice of meat from its haunches to satisfy his momentary wants, he leaves the carcase, taking however the trouble to extract the claws which are considered talismans.

Trade with the horns.

There is a trade carried on with the horns, which is entirely monopolized by the Chinese and destined solely for the Chinese market, where the horns are esteemed a valuable medicine, used either transformed into drinking vessels, and supposed to contain the virtue of discovering poison, or the horn is filed into powder and taken internally on extraordinary occasions.

Superstition and fraud with the horns.

But like everything with the Chinese has some mystery known only to themselves, so it is also with the horns. To excuse the inefficacy of the pretended invaluable arcanum, which in fact must manifest itself too often, they assume to know certain signs of exalted innate virtue, which, if found, increases the price very much, and for this reason it is difficult to know the pretended or real value of the article.

The greatest number of rhinoceros is shot in the southern parts of the provinces, and one Chinese is settled in the old village of Tenasserim, chiefly for the purpose to buy up first hand all horns which can be procured.

The poor ignorant Careans are always the dupes; they do not know the value, and barter it for trifles. The Careans have sold small horns at Rs. 3 per piece.

In China the same sell from Rs. 30 to Rs. 50. The trade could be carried on on a larger scale if the hundreds of islands of the Mergui Archipelago would be visited, many of which have never been penetrated by men—they swarm, it is said, with rhinoceros.

Hides not used.

It is a great pity that no notice has been taken of all the hides which have been permitted to decay, by which negligence the firmest and strongest leather in existence is lost and wasted.

Rhinoceros a domestic animal.

It is generally acknowledged that the full grown rhinoceros is one of the wildest animals, yet it is known that young ones have been perfectly domesticated; it has even been proposed to employ them for carrying burthens like buffaloes and tame them for agricultural purposes.

HIDES IN GENERAL.

Trade with the hides entirely neglected.

The trade with hides, so very common in countries which are just emerging from a state of rudeness, where men have occupied but a small space, and animals are the undisturbed masters of the country, is entirely unknown on this coast, though there is a variety of skins, hides and even furs, which are allowed to run waste.

The carcases of elephants are allowed to decay without taking off their skin. It is known that the savage tribes in Africa seldom allow this to happen, and among the Ashantees the armour of their warriors is partly made from elephant skin, and the elephant tails are emblems of royalty.

The skin of the rhinoceros is still more valuable, being when dry so strong and elastic that no musket ball can penetrate—it is supposed that some of the invaluable shields of the heroes of antiquity were covered with the hides either of the hippopotamus or rhinoceros; there are hundreds annually shot, yet nobody ever thought to divest the carcase of the skin.

Buffaloe hides.

The same carelessness takes place with the hides of the buffaloes. The buffaloes are the only cattle of the Burmese, and they are chiefly in those parts where rice cultivation flourishes numerously.

The Burmese use only the buffaloe to prepare the rice ground, and to tread the paddy out; they neither eat the meat, nor use the milk, nor sell the hides. Towards the end of 1836, unfortunately a great epidemic affected the buffaloes of the whole province, and it carried away it is supposed 20,000 buffaloes, one-third of the whole number in existence. Not one single skin of this great number came in commerce, even the horns were allowed to lay scattered about, though the trade of buffaloe horns in India is not inconsiderable. But so much are all resources in these provinces unknown and unused, that only since two years some Mogul merchants in Moulmain began to collect buffaloe horns, which are to be got at a very low price.

Deer skins.

A trade with deer skins does not exist at all; in Siam on the contrary a considerable trade in that article is carried on with the Americans and Chinese. The number and variety of deer is great, but they are seldom shot by the natives, who prefer the wild hog as a venison, and they remain a quiet prey to the numerous tigers.

Tiger skins.

The skins of the tiger, panther, leopard and cheater are equally unused and their value entirely unknown. I had opportunity to buy good tiger skins at eight annas per piece. In Moulmain, where people get a remuneration for killing a tiger from Government, they throw, after having brought some part of the animal, the tiger itself in the river, without further notice, or leave it in the jungle.

Squirrel skins.

The large black squirrel abounds in the forests, and is I am told an acceptable fur to the Chinese, yet it may be easily imagined that it is still less known to be of any use.

Birds' skins for Mandarin dresses.

It is here the place to mention a petty trade which is carried on with the skins of one species of bird of the genus halcyon or king-fisher, part of whose feathers are of a beautiful sky blue colour, and which are eagerly bought up in China, where they are used for Mandarin state dresses. The people chiefly on the Upper Attaran are occupied with the chase. They tame one of these birds, and place it upon a trap in which the bait consists of a fish. The wild bird rushes with impetuosity into the trap to seize the fish before his supposed antagonist has time to get at it.

The people dry the skins in the sun, and sell them in bundles of ten. I am told the price they get is four annas per piece.

Productions of the sea.

I am very little acquainted with the productions of the sea, having had no opportunity to visit much the coast or any of the islands. The productions of the islands, however, are precious; those from which Government derive any revenue are the following: fisheries in general, gnapee, or a paste prepared from small shrimps, a common and indispensable article of food among the natives, tortoise shells, birds-nests, sea slugs. There are besides corals and pearls and pieces of amber to be found, but little about this is known.

In the hands of the Chinese.

It is necessary to observe that the productions of the southernmost parts of the provinces, chiefly those of the Mergui Archipelago, are almost entirely in the hands of the Chinese and some few Malays.

The scanty intercourse with the islands, sometimes none at all, places the people there at the mercy of every one, who will profit of it to impose upon these poor migrating fishermen, who inhabit them, and the headmen, as well as the Chinese traders, are able to

Great abuses.

do it with secrecy and impunity. It is generally said to be the case that they intoxicate these poor wretches at first with opium

and arrack, and spoil them afterwards deliberately of the valuable productions of the sea which they have contrived to collect.

Endeavours to induce these people to come to Mergui, to bring the amount of their taxation in kind to the place, to have it sold before their eyes by public auction, and to get the surplus faithfully back, have proved hitherto unprevailing; like the Careans of the interior, they are afraid to visit the towns, though they ought now already to know that their persons are safe, and that nothing but justice will be done to them. The sad experiences which they had opportunity to witness in the time of the oppressive and arbitrary disposition of the Burmese rule are not yet forgotten, and these poor tribes know nothing about the new Government, except that they have less taxes to pay, even which fact some of their wise men explain to be a snare to entice them.

WAX—HONEY.

There are several kinds of bees working wax and honey, all of whom are different from the European species.

Different kinds of bees.

One very large kind builds a nest or combs on the lower part of the branches of teak trees in the form of a protracted pouch or bag. Several families or swarms occupy the same tree, and one large tree on the Tenasserim was loaded with 43 distinct nests.

Different kinds of honey.

This is the jungle or tree honey which is got in a liquid form of syrup consistency, of a yellowish transparent colour. It is a favourite dish of the Careans, who are very skilful to smoke the bees out at night-time.

Another kind of bee builds its nests only on limestone rocks, and selects generally a perpendicular wand. There is an isolated limestone rock on the Tenasserim, which is occupied by numerous swarms, and the approach to it in the day-time is considered very dangerous. Another rock to the south of the village of Tenasserim is considered Government property, and the getting of honey and wax there is rented out. The honey of this kind is more liquid than the first, of a reddish brown colour, more sweet and aromatic than the first. The very superior hard honey of Ava, which properly speaking comes from the Chinese frontiers of Yunan, is in the country unknown.

Varnish formed by bees.

Another kind of bees forms its nest, instead of wax, of a substance which belongs to the resinous gums, and yields that valuable substance which has been considered a vegetable production, and which since late years has been imported to Europe under the name of dammer from Sumatra.

It yields a varnish which has been used for coating paintings, and has been considered valuable and superior to copal.

Pitch, a production of bees.

The common pitch used in Moulmain for ordinary purposes is also an animal production, and is equally part of the nest of a bee

which inhabits hollow trees. This species inhabits chiefly the neighbourhood of the teak forests, and the substance is brought from the Upper Attaran.

Upon examination I found that with proper treatment it yields a substance very similar to the Venetian or Bordeaux turpentine. This production must be distinguished from another kind of pitch which sometimes is to be got in the bazar of Moulmain, and which is the resin of a pine tree growing in the high table-lands between Amherst Province and the Burmese territory, Shan State of Labong.

BIRDS' NESTS.

Birds' nests of Mergui Province.

The birds'-nest islands (more properly rocks) subject to this province, have generally been sold at auction for a term of years.

The last three years they have been engaged by an old Malay; they were sold to him at Rs. 2,000 a year. The time for collecting the nests is from January to April; the average quantity collected may be reckoned at from 50 to 60 viss annually.

They are of three qualities:—

The first selling at from	100	to	120	Rs.	per viss.
„ second „	70	to	90	„	
„ third „	50	to	60	„	

The birds' nests are seldom if ever sold at Mergui; they are generally taken to Penang by the renter, where he finds a much better market for them.

SEA SLUGS, BÊCHE-DE-MER, 1837.

Statistical notice from Mr. Corbin,

Of these there are three qualities brought into the market, the long black, the round black, and the white; the first is considered by far the best and is sold at a very high price. In 1837 the undermentioned quantities were sold in this market:—

362 viss	of	long black,	at Rs.	150	per 100 viss,	Rs.	543,	duty 10 per ct., Rs.	54 7
2,770 „		round	„	35	„		969	„	96 14
3,600 „		white	„	15	„		540	„	54 0
6,732							2,052		205 5

The sea slugs are collected and cured on the islands of the Mergui Archipelago during the N. E. monsoon, chiefly by the Salonese (or inhabitants of the islands), but the Chinese and Malays also collect, cure, and bring them in for sale.

TORTOISE SHELL.

During the N. E. monsoon of 1837, 33 viss of this article were brought in this market for sale by the above-mentioned people, at the average price of Rs. 20 per viss; 33 viss, at Rs. 20 per viss, Rs. 660—duty 10 per cent., Rs. 66.

FISHERIES.

The duty on fishing stakes is collected monthly, each stake being taxed at a certain rate according to its size.

In 1837, the duty collected amounted to Rs. 2,097.

Gnapee.

The fish with which this article is made is caught in large split bamboo baskets, made for the purpose, and moored in the stream, running in and out of the different rivers; the fish is taken out of the baskets at the change of each tide. It is settled that each person pay to Government a certain sum for the season, in proportion to the number of these baskets which he may be working.

In 1837 the amount of revenue in gnapee paid into the treasury was Rs. 2,339; in 1838, Rs. 2,242.

The daily consumption of fresh fish in the town of Mergui may be calculated at about one viss to every 12 persons.

J. W. HELFER.

MERGUI:
The 23rd July 1838.